Vol. 10, No. 3 MARCH, 1955

AGRICULTURAL CHEMICALS

In This Issue:

Sales Symposium • Slowly Available Fertilizers • Phosphate Insecticide Research • Phosphatic Fertilizers
World Trade • What's A Pathologist? • Colombia-FOA Program • NW Ag Industry Conference

Giant Servant of Agriculture

He climbs higher — who helps another up.

To be the servant of agriculture has been the guiding purpose of our company since its inception. The providing of essential plant food to the fertilizer industry enables many manufacturers to achieve new sales goals.

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The SALT of the EARTH
RED MURIATE

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CARLSBAD, NEW MEXICO.

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He hasn't a good word to say for Attaclay

Carriers for soil pesticides

We are leaders in developing granular grades for soil pesticides, herbicides and fungicides. Write for samples and for your copy of our latest report on this promising field.

What's bothering this aphid? Perhaps it was the helping of Attaclay-formulated pesticide dust he just consumed. Oh well, if *he* hasn't a good word to say for Attaclay, *you* will have!

Why? Because Attaclay is the carrier and diluent that helps you lick stickiness . . . heaviness . . . lumpiness—three troublemakers for the manufacturers (and users) of dust bases, wettable powders and finished dusts.

Primary Processors like the great fluidity of Attaclay, as received. Its extra-high sorptivity eases grinding operations—makes it a "natural" for liquid impregnation—keeps dusts on the move through materials handling equipment—delivers dry, free-flowing, premium-grade products.

Blenders start off ahead of the game if they use flowable Attaclay-formulated dust bases . . . and stay ahead by using Attaclay as diluent or conditioner.

Growers are pleased at the way Attaclay-based powders disperse and suspend in spray tanks; the way dusts flow, disperse, settle, cover, stick and kill.

For *maximum flowability* from formulation to field—specify Attaclay.

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MINERALS & CHEMICALS CORPORATION OF AMERICA

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AGRICULTURAL CHEMICALS

A Monthly Magazine For the Trade

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This Month's Cover

A relatively new development in the home garden market has been the introduction of aerosol dispensers for insecticides, fungicides, fertilizers, etc. Illustrated are a few new commercial products for the home garden, including some of the new aerosol-type containers.

MARCH 1955
Vol. 10 No. 3

In This Issue:

Editorials 31
Stay Alive in '55 . . . A Symposium 32
By T. W. Brasfield, F. H. Cappy, E. D. Witman, F. W. Hatch, C. Kampmeier, G. W. Hill, John Kirk, S. James, M. R. Sias, S. K. Chestnut
Slowly Available Fertilizers 36
By J. D. Joffe
What's A Pathologist? 39
By Paul Miller
Recent Developments in Phosphate Insecticide Research..... 41
By Rosmarie Von Rümker
The Significance of Water Solubility in Phosphatic Fertilizers 44
By J. E. Webb
Michigan State College-Colombia in FOA Program 47
The Future of the Pesticide Industry's $50 Million World Trade 49
By J. Merritt
NW Agricultural Chemicals Industry Conference 53
By Charles Starker
Pennsylvania Agricultural Experiment Station 55
By M. A. Farrell
The Listening Post 57
By Kelvin Dorward and Paul R. Miller
Washington Report 61
By Donald Lerch
Technical Section 63
Industry News 73
Industry Meeting Calendar 89
Suppliers' Bulletins 109
Classified Advertising 135
Advertisers' Index 137
Tale Ends 138

AGRICULTURAL CHEMICALS

Subscription Rates: *One year, United States,* $3.00; *Canada and Pan American countries,* $4.00; *Foreign,* $7.00. *Published monthly on the 5th by Industry Publications, Inc. Publication office,* 123 *Market Place, Baltimore* 2, *Md. Advertising and editorial office P. O. Box* 31, *Caldwell, New Jersey — Chicago Office,* 333 *N. Michigan Blvd.*

Advertising rates made known on application. Closing date for copy— 10th of the month preceding month of issue.

Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

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With Tennessee Custom Formulated Mineral Mixtures — It's easy to have a completely mineralized fertilizer. We custom mix any combination of minerals to your own specifications — There is only one ingredient to add to your regular fertilizer for a completely balanced plant food — No additional labor or mixing facilities are required since Tennessee Custom Formulated Mineral Mixtures come to your plant — in bulk or bag — already carefully mixed in controlled amounts of soluble, readily available forms of Copper, Manganese, Iron, Zinc, Magnesium and Boron. With a Tennessee Custom Formulated Mineral Mixture — you cut down on raw material cost, number of items purchased and handling time.

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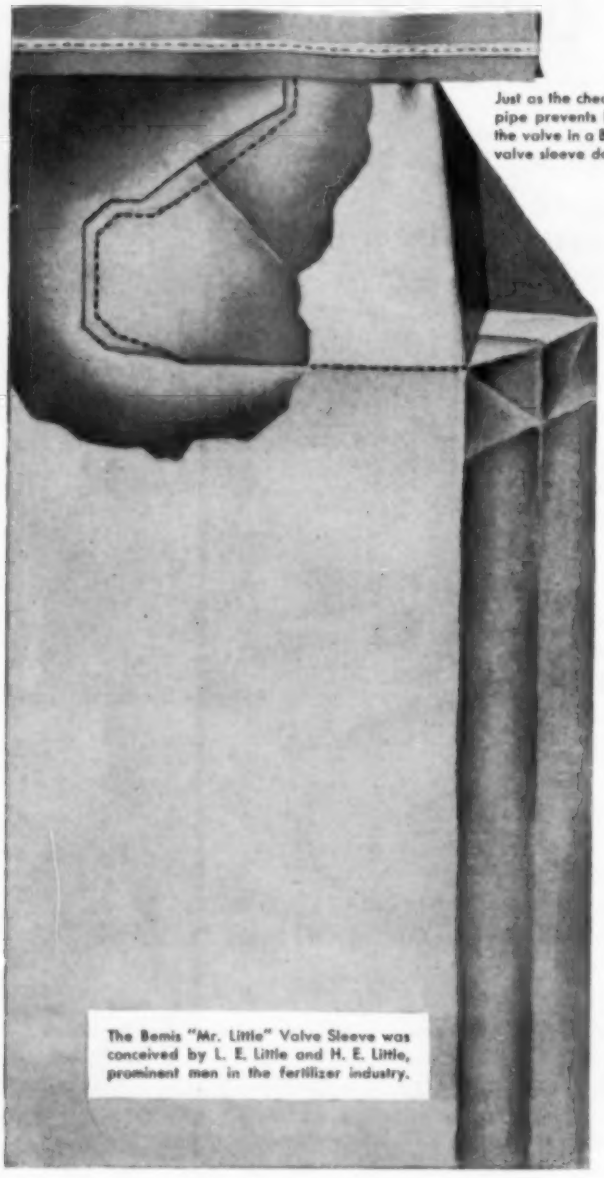
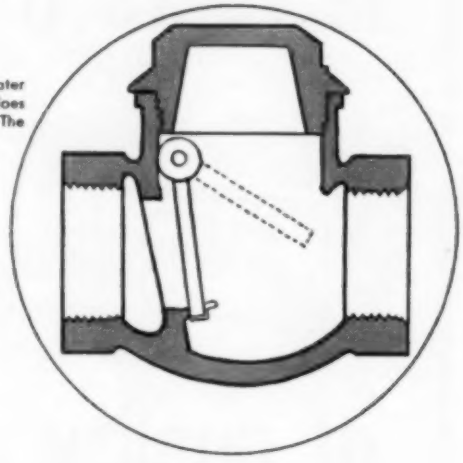
The most revolutionary Multiwall Bag development in years!

the NEW Bemis "Mr. Little" Valve Bag*



The Bemis "Mr. Little" Valve Sleeve was conceived by L. E. Little and H. E. Little, prominent men in the fertilizer industry.

Just as the check valve in a water pipe prevents back flow, so does the valve in a Bemis Multiwall. The valve sleeve does the trick.



Maximum Sifting Protection—Creases in the valve sleeve—a new principle—give a faster-acting, tighter closure particularly with troublesome granular or pelletized products. It *really seals in* the bag contents.

Valve Corner Moisture Protection—Since bag contents do not get into the valve pocket, "wick" action that draws moisture into the bag is avoided.

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Ask your Bemis Man for the *complete* details. He'll gladly show and demonstrate the revolutionary new "Mr. Little" Valve Bag. Write or call him today.

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cuts mixing costs

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From cake to clothing

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This new member of Atlantic's chemical family has a variety of uses. On the farm, for instance, Anhydrous Ammonia is released into the soil where it supplies vital plant food to increase crop yields. Its use in the manufacture of synthetic fibers means new and better fabrics for clothing of all kinds.

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Atlantic sales engineers will be glad to work with your technical personnel to help improve quality, reduce costs, or develop new products. Write for information; just ask us how Atlantic petrochemicals can be helpful to you. The Atlantic Refining Company, Dept. J-3, 260 South Broad Street, Philadelphia 1, Pa.

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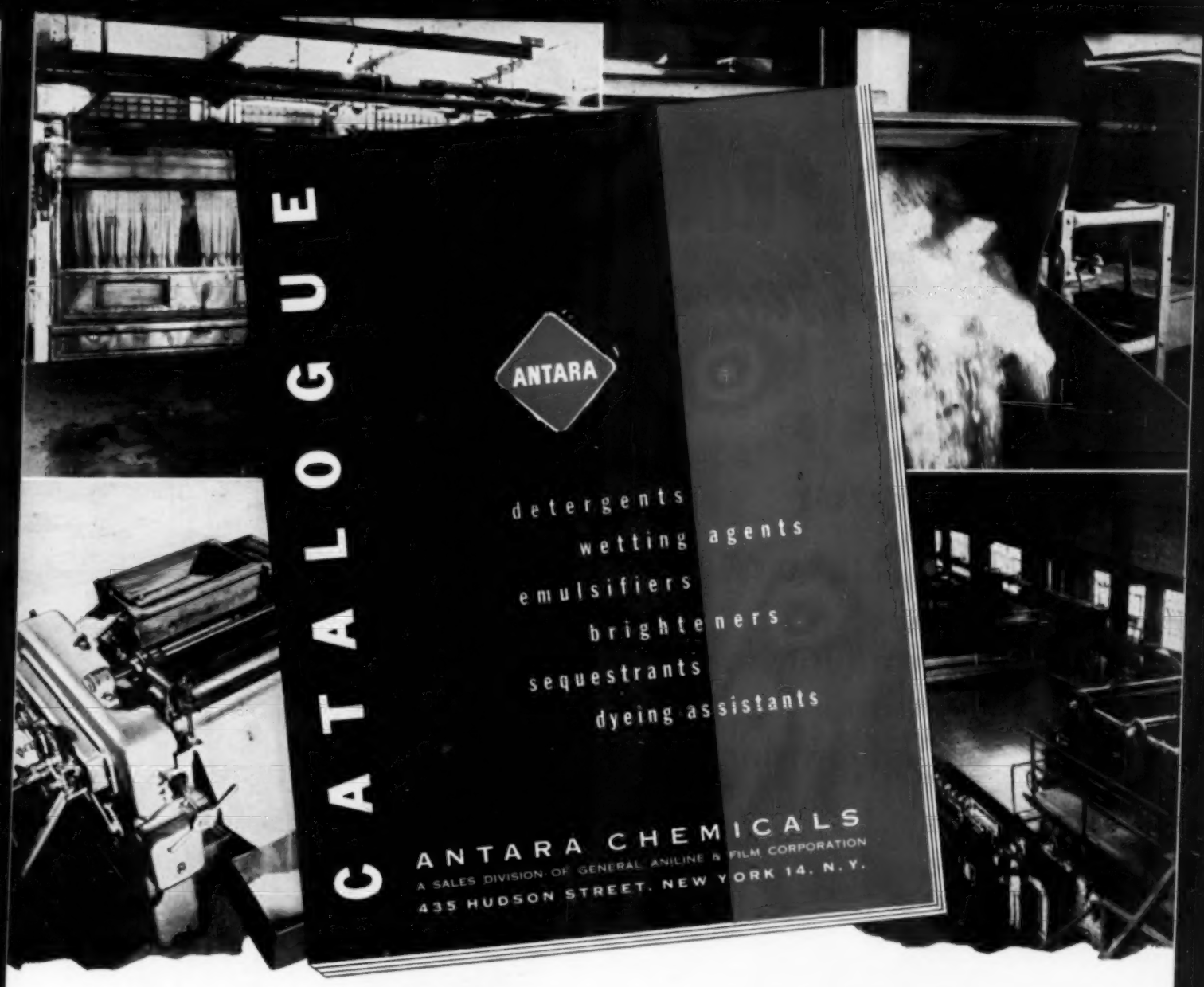

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Information on chemical composition, physical properties and application is given on the established products and on new chemicals released in the past few months. In addition, there is a listing of Antara's intermediates.

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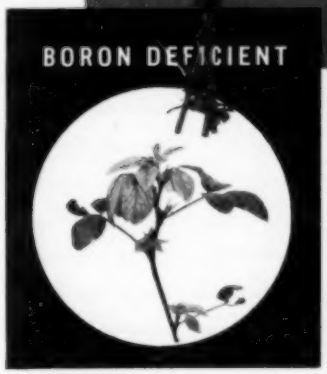
Fertilizer Borate

(HIGH GRADE)

can give you an extra ton of Alfalfa hay per acre...



Look for These Symptoms in Alfalfa: Lack of boron causes plants to become puny and dwarfed. Look for yellow or reddened top leaves, stunted, with growing tips rosetted. See close-up photograph in circle for excellent example of boron-starved plant characteristics.

See for yourself what Fertilizer Borate, with its high boron content, meant to this alfalfa field. Boron, so vital to alfalfa, is also required by other field crops such as clover, sweet corn, tobacco... and most vegetable and fruit crops. This year, invest a few extra pennies per acre in Fertilizer Borate... the low-cost fertilizer grade of borax... to grow better crops!

● *Fertilizer Manufacturers*— ***Here's Borax at the Lowest Cost per Unit... It's Fertilizer Borate-High Grade!***

This sodium borate concentrate, developed especially for the fertilizer trade, has higher analysis... approximately 121% borax equivalent. Choice of fine or coarse mesh. *Write for Bulletin PF-3!*

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Outstanding in appearance and durability . . . Hammond Multi-Wall bags create enthusiasm and pride among your sales representatives . . . help to increase sales through distributors and dealers . . . build prestige for your company and products, and provide complete protection of contents from packing machines to the ultimate consumer. Yes, you can put your shipping sack on your sales team by specifying Hammond Multi-Walls.

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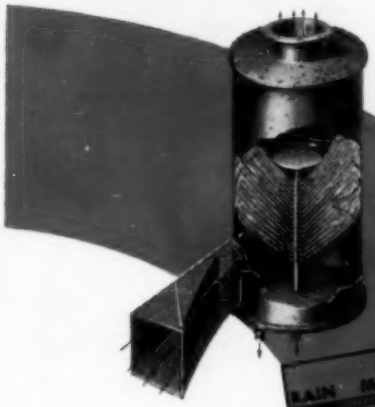
The first 2 steps to eliminate

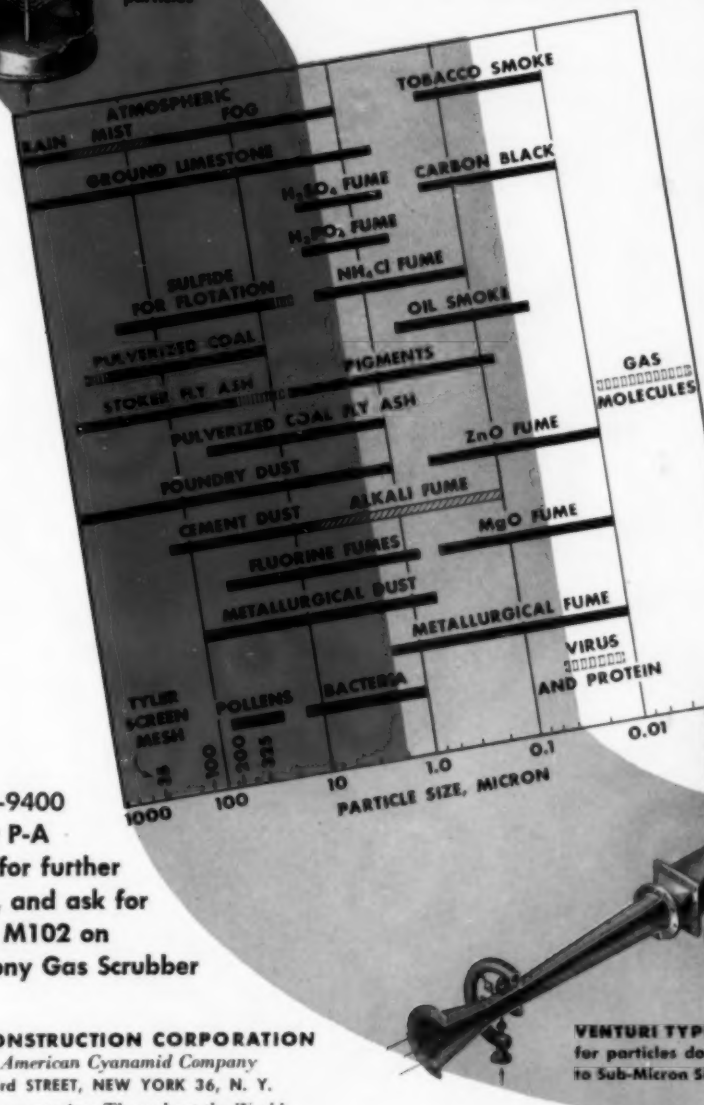
DUST or FUMES

in your plant

1 Pick out your dust or fumes in this chart of particle sizes to determine the type of P-A Scrubber to be used



CYCLONIC TYPE
for Micron Size particles



VENTURI TYPE
for particles down to Sub-Micron Size

2

Phone LO 4-9400 or write our P-A Sales Dept. for further information, and ask for our Bulletin M102 on Pease-Anthony Gas Scrubber

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CHEMICO P-A SCRUBBER

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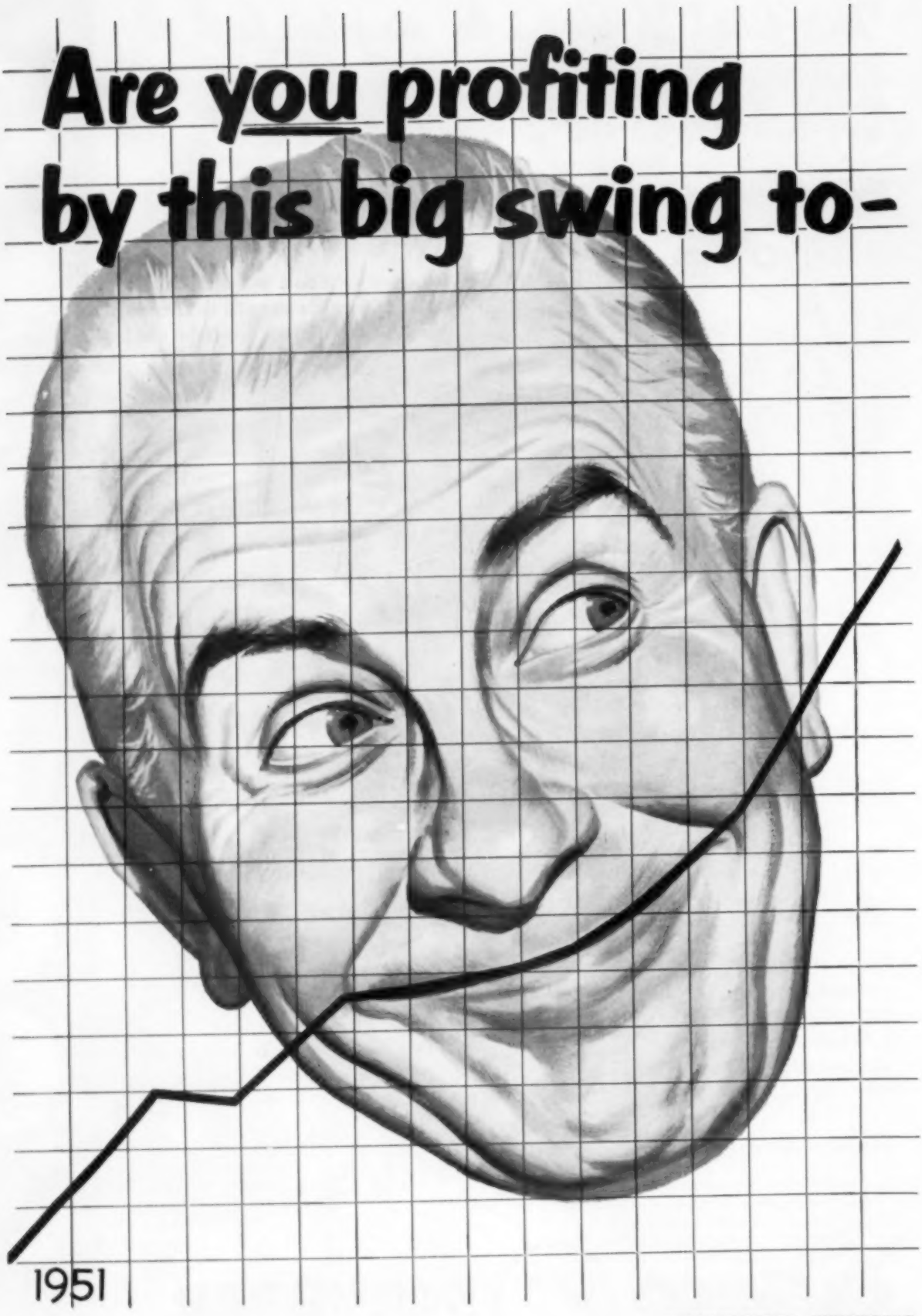
Are you profiting
by this big swing to-
1951

IN AN AMAZINGLY SHORT TIME the sales of aldrin and dieldrin have skyrocketed! There's a good reason! Both of these powerful insecticides have proved to be top controls for many kinds of crop pests . . . and constant research keeps uncovering more and more uses all the time.

Aldrin gives fast, dependable control of pests that infest corn, cotton, peanuts, wheat, barley, rye, oats and tobacco. And aldrin is recognized internationally as the Number 1 hopper stopper.

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Progressive Formulator of Sullivan, Ill., Makes and Sells It with Monsanto Phosphoric Acid.

The flow of phosphoric acid is gauged from the storage tank into a stainless steel vat where the liquid fertilizer is being blended.

Potash nutrient pours into the anhydrous ammonia-urea-phosphoric acid mix in the vat. Phosphoric acid used is completely soluble—made from Monsanto 99.9% pure electric furnace elemental phosphorus.

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Truck begins spraying concentrated liquid fertilizer on the field. Formulator's entire operation is fast, simple and requires only one man.

Spray rig features simple design, adjustable boom and rapid-delivery nozzles. Pump delivers fertilizer from tank with equal pressure at all nozzles.

Photographs courtesy Alyward Fertilizer Company

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Diammonium Phosphate	(21.0-53.8-00.0)
Monoammonium Phosphate	(12.2-61.6-00.0)
75% Phosphoric Acid	(00.0-54.5-00.0)
Dipotassium Phosphate	(00.0-39.9-53.0)
Monopotassium Phosphate	(00.0-51.6-34.2)

They're highly concentrated—cost you less to store and handle. They're pure—give you extremely close control of formulation. And—your supply is assured by Monsanto, world's largest producer of elemental phosphorus. Write now for "Concentrated Water Soluble Fertilizers" to MONSANTO CHEMICAL COMPANY, Inorganic Chemicals Division, 710 North Twelfth St., St. Louis 1, Missouri.

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Serving Industry . . . Which Serves Mankind

in the bag

It delivers extra fertilizer power!—more effective!—better balanced!

on the bag

N-P-K-Mg . . . visible evidence of greater effectiveness!

added sales with Sul-Po-Mag®

Harvest-time results that prompt farmers to insist on fertilizers with Sul-Po-Mag, year after year!

Sul-Po-Mag is produced exclusively by the *Potash Division* for use in quality mixed fertilizers and is also bagged for direct application. It makes fertilizers *more effective* by supplying water-soluble *sulfate of magnesium* in balanced combination with *sulfate of potash*, a premium form of potash. As an ingredient in mixed fertilizers, *Sul-Po-Mag* is the most satisfactory way for farmers to supply soluble magnesium . . . called, in many areas, the *fourth element* in the fertilizer bag. At Carlsbad, New Mexico, the *Potash Division* mines and refines these fine quality products for fertilizer manufacturers—Muriate of Potash, Sulfate of Potash and Sul-Po-Mag.

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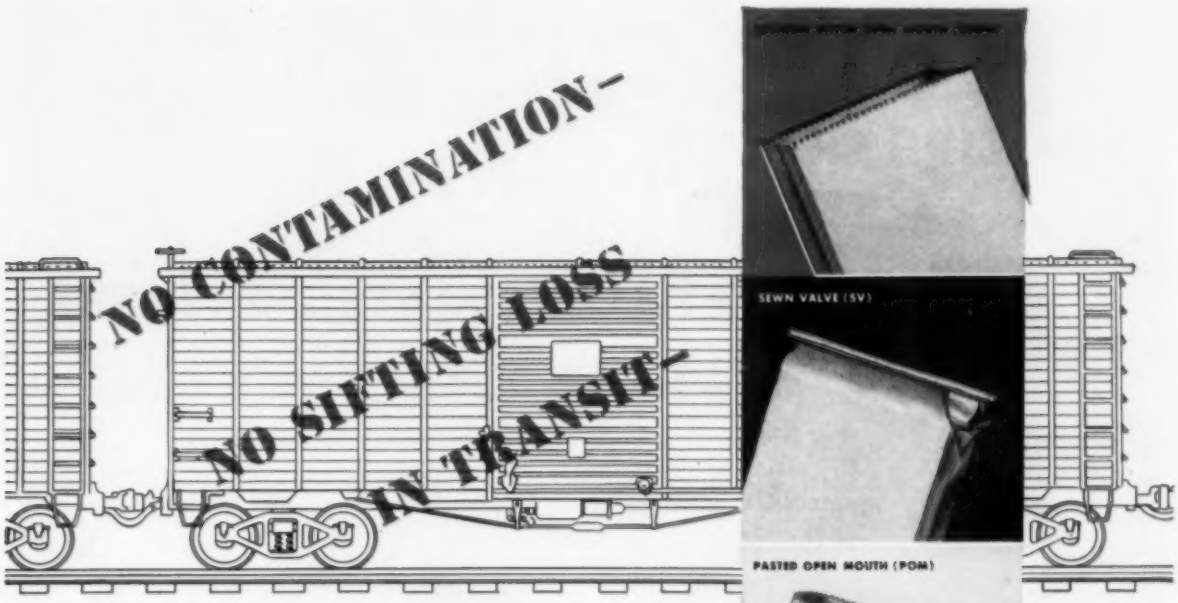

when you bag in

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Bagpak Multiwalls assure constant, perfect protection against loss and contamination in transit and storage. Bagpak offers five basic types of Multiwall Bags for proper packing and shipping of every type of commodity:

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- *Sewn Valve (SV)*
- *Pasted Valve (PV)*
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- *Automatic (SOS)*

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220 E. 42 Street, New York 17

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life to crops; **death** to insects

You can give new life and added vigor to your fruits or vegetables — and kill harmful insects at the same time — by adding GRACE UREA PRILLS to your regular pesticide sprays.

It's the simplest and quickest way to give your crops the supplemental nitrogen they need — over and above what is supplied to them in mixed fertilizers.

GRACE UREA PRILLS' fertilizing power — an unsurpassed 45% nitrogen — is full strength and quickly absorbed by foliage. You get top efficiency, because roots absorb any spray dropping to the ground. And GRACE UREA PRILLS are compatible with any commonly used spray material. This fertilizer is safe to handle, dissolves readily and does not corrode or clog spray equipment.

Suggested amounts for mixing with pest-control sprays are given in the chart at the right. Less concentrated solutions may be used, depending on the frequency of spraying and the specific nitrogen needs of your particular crop and soil.

Pounds GRACE UREA PRILLS suggested per 100 gals. Spray

VEGETABLES	LBS.
Tomatoes, cucumbers, cabbage, cauliflower, celery, lettuce, peppers, snap-beans, sweet corn, strawberries	4-5
Sweet potatoes	5-10
Potatoes	15
Carrots, parsley	20
FRUITS	
Apples	3-5
Cherries	5
Plums and Prunes	10

USE GRACE UREA PRILLS FOR ALL TYPES OF CROPS • IN IRRIGATION WATER • AS A TOP-DRESSING OR SIDE-DRESSING • WHEREVER NITROGEN IS NEEDED

AVAILABLE IN 80 LB. MULTIWALL SACKS FROM YOUR LOCAL DISTRIBUTOR

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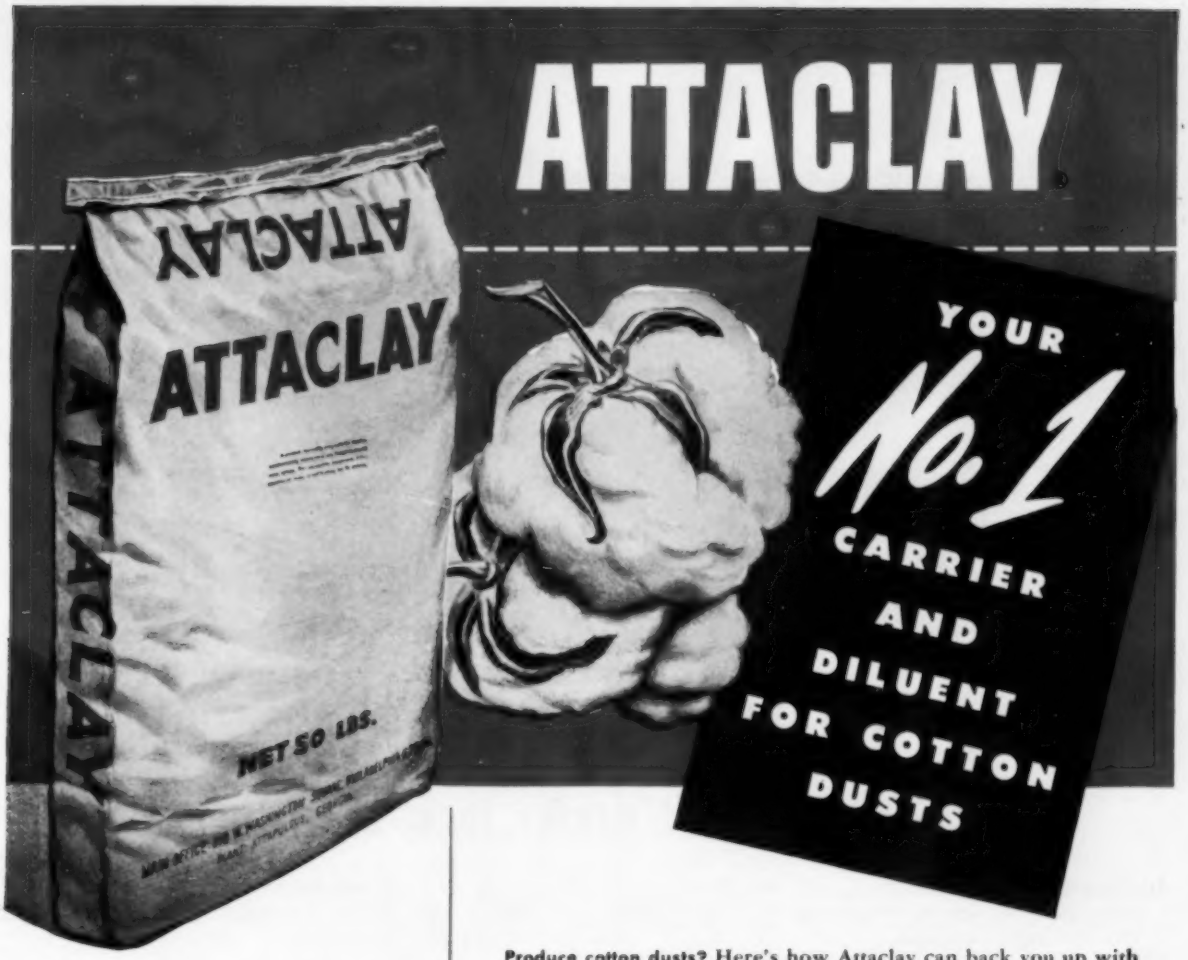

ATTAPULGUS carriers for SOIL PESTICIDES

Granular grades have been developed which have formulating and field application characteristics of particular value in soil insect control. Like "thirsty" Attaclay, these commercially-proved granular grades have great sorptive capacity, insuring easy and effective processing. Excellent coverage results are obtained when applied either from the ground or the air. Particle size ranges to suit all formulations. Write for data sheet and free test samples.

Produce cotton dusts? Here's how Attaclay can back you up with fine carrier and diluent performance at low cost:

FLEXIBILITY. Attaclay is a top-heavy favorite in the following cotton insect control formulations: Toxaphene; DDT-BHC; aldrin and aldrin-DDT; dieldrin and dieldrin-DDT; endrin; parathion; heptachlor-DDT; aramite; chlordane-DDT (in areas where recommended). Could you do better than standardize on one carrier which handles them all?

OVER-ALL EFFICIENCY. Attaclay's great sorptive capacity smooths out all types of processing techniques and delivers dry, free-flowing bases. It eases grinding operations with low melting point solids. It permits a one-step procedure when grinding solids in combination. It offers a really satisfactory way to formulate liquid toxicants by direct impregnation. It is highly desirable for direct preparation of field-strength dusts, or for conditioning. You can rely on Attaclay to boost production schedules and enhance product quality.

Cotton dust problems? Let's team up to lick them!

ATTAPULGUS

ATTAPULGUS DIVISION
Minerals & Chemicals Corporation of America
DEPT. P, 210 WEST WASHINGTON SQUARE, PHILA. 5, PA.

Farmers profit 6 ways from plow down

—with Cyanamid

"Agriculture's most useful form of nitrogen"

1. Farmers get MORE HUMUS, FASTER from cover crops and crop wastes by plowing them down with free-flowing Cyanamid.

2. Cyanamid supplies necessary lime. Cyanamid contains the equivalent of 70% hydrated lime, as well as 20% of the right kind of nitrogen. Farmers need this lime to neutralize soil acidity. And these are the proper proportions of nitrogen and lime to form a maximum of humus from the organic material plowed down.

3. The 20% nitrogen in Cyanamid resists leaching . . . is available to crops from plow down until harvest, come drought or heavy rains. This "staying" quality of Cyanamid nitrogen permits plow down *at any time of year.*

4. Plow down with Cyanamid places nitrogen in the root zone where it can be used by the plants. It encourages deeper rooting, helps crops withstand drought.

5. Using Cyanamid AVOIDS the reduction in yield which often follows plow down of crop wastes and mature cover crops alone.

6. Production costs go down, because Cyanamid eliminates the expense of side- or top-dressing.

MAKE SURE YOU PROFIT, TOO . . . by selling AERO® Cyanamid, Granular—agriculture's most useful form of nitrogen. Every one of the advantages above is a potent sales argument, a convincing reason why Cyanamid for plow down is an agricultural "best seller."

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AMERICAN Cyanamid COMPANY

AGRICULTURAL CHEMICALS DIVISION

30 Rockefeller Plaza, New York 20, N. Y.

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PHOSPHATES for Acidulation and Direct Application
THIOPHOS® Parathion Technical
MALATHION Technical
CYANOGAS® Calcium Cyanide Fumigants
HCN Fumigants
POTASSIUM CYANATE Weedkiller for Agriculture and Turf

Editorial
COMMENTS

MARCH is the month of perennial optimism in the agricultural insecticide business,—the period when no matter how bad things may have been last season, everyone right down the line,—manufacturer, formulator, dealer, custom sprayer, gets the feeling that this could be another of those big sales years like 1950 or 1951. And it is the period of the year when important decisions must be taken, for what is more important in this field than the question of how heavily to stock in advance of appearance of demand? Unless one is a little optimistic in March, the material simply won't be on hand to sell even if those infestations which are anticipated in June or July do develop.

The trade views the approaching season with moderate enthusiasm, to judge at least from the opinions expressed in a survey which *Agricultural Chemicals* has just completed. There are a number of new markets for pesticidal chemicals being opened up. There are new products to sell which will give the sales department fresh ammunition in their continuing efforts to expand the market potential. Aerosol packages for agricultural chemicals should give the home garden market a lift.

But one would have to be a complete optimist not to be conscious of the fact that there are a number of obvious clouds on the horizon. For the formulators, it is easy to predict lots of trouble. There has been a growing trend over the past year or two among manufacturers of basic insecticidal raw materials to by-pass the formulator. Maybe they have simply been disgusted with the hash that has been made of the whole field,—the price cutting, the failure to insist on a legitimate profit on a quality product.

It has always been our feeling that in an orderly marketing operation the producers of the basic raw materials normally preferred to market their output through a few hundred mixers, formulators and repackers rather than to take on all the problems of servicing forty or fifty thousand dealers, or, even more stupendous, direct sale to millions of actual users. But over the past year or two we have heard more and more talk from some of the basic manufacturers as to the desirability of "upgrading" their basic chemicals, and taking the long profit on sale of finished products to the actual consumer. But no one has yet found a way to play both sides of the street,—sell raw materials and still compete in the market for finished goods.

Whether one agrees with this basic economic philosophy or not, there is no denying the fact that an increasing number of producers of basic insecticidal chemicals have made the big decision to by-pass the formulator, and to compete with him for the dealer and consumer markets. Thus we see trouble ahead for all concerned in the increasing competition for what could again be a limited market potential.

And, as many formulators and some of the larger dealers would be quick to point out, the errors have by no means been all on their side. Manufacturers of the basic agricultural chemicals like DDT and 2,4-D have contributed to demoralization of the market by their pricing and consignment policies. There is obviously little to attract strong factors in the normal dis-

(*Continued on Page* 117)

Stay Alive In '55 . . .

T. W. Brasfield
Naugatuck Chemical
Naugatuck, Conn.

THE Agricultural Chemical Department of Naugatuck Chemical sells its products through formulators, distributors, and wholesalers and for that reason feels that unity of promotional effort is of primary importance. Naugatuck Chemical began laying its plans to promote and increase the sale of its products in 1955, early in July of the preceding year.

Since accurate timing and the coordination of sales efforts with those of our customers are most beneficial to all concerned, our *complete* advertising and sales promotion program for 1955 was reproduced in book form — and presented to them about mid-January of this year. This portfolio provides our formulators, distributors, and wholesalers with a complete schedule of advertisements on each product, by crops, media, and times of insertion. Even magazine circulation is given.

It provides them with typical advertisements by product and crop. It further offers radio commercials, product booklets, bulletins, Timely Farm Tips, and examples of publicity stories we are are competent to write and place. Stand-by advertisements for emergency conditions are also portrayed.

We feel that with this packaged program in hand, the customer cannot help but get the utmost from his nicely timed efforts through coordination of his timing and sales program with ours.

In addition to the overall assistance through forward planning outlined above, we are selectively offering this year a colored film on "Suckering Tobacco with MH-30," television shorts on the same subject, and spot radio announcements on MH-30, "Aramite," "Phygon," and "Spergon." Reprints of magazine articles on MH, our growth inhibitor, have been widely distributed and new booklets covering new products, later discussed, are in preparation.

We believe this adds up to a massive selling program which must help, not only our immediate customer, but the eventual users—the growers.

Regarding new products for 1955, or new uses for established materials, the picture is as follows:—

Alanap-1—a 90% wettable powder—has been developed as a pre-emergence weed killer for use on cucurbits and asparagus. Registration is pending for use on nursery stock.

Alanap-3—a 2 pound active liquid—shows great promise as a pre-emergence weed killer in soybeans, and for pre-emergence and lay-by applications on irrigated cotton; tests on peanuts, cucurbits, nursery stock, and other crops will continue in 1955.

Duraset-20W—a fruit and pod setting hormone—is being developed for use on lima beans. Other potential uses are as a fruit-setting hormone for tomatoes, green and wax beans, small seeded legumes, peppers, cherries, peaches, avocados, citrus, and olives.

MH-40 will be widely offered for the killing of quack grass and other nuisance grasses..

MH-30 will be promoted extensively for control of tobacco suckers.

Phygon-XL—our old stand-by for the control of apple scab, peach leaf curl and similar fruit diseases—will be offered as the only means of controlling mint rust, and developed as an algicide for the control of blue-green algae.

Aramite—15% wettable powder will be promoted as a means of controlling poultry mites—an affliction that materially influences our nation's egg supply.

Aramite—wettable powders have been developed after four years of extensive research into most effective citrus mite killers for use in Florida, Texas, and California.

Frank H. Cappy
American Cyanamid Co.
New York

WE are quite optimistic about business possibilities for agricultural chemicals in 1955. While selling will be more difficult on some products than others, we are particularly encouraged by the outlook for malathion.

We have had a long list of labeling claims accepted for use of this insecticide on fruits, vegetables, and flies, particularly on the major pests attacking home gardens and for two major pests of poultry. While the poultry claims are for use in hen houses, they do not yet include use directly on the birds.

In addition, we have claims pending on citrus, and anticipate addi-

A symposium on manufacturers' sales programs to help formulators, mixers, dealers, distributors sell more agricultural chemicals this season

tional claims for use directly on poultry and cattle and also for the control of mosquitoes and household insects. Malathion also looks promising for use as a grain protectant.

Our confidence in the increased use of malathion is further expressed by the heaviest advertising campaign we have ever put behind a single product. Not since the introduction of DDT and parathion has an insecticide appeared with so many uses and offering such large potential profit possibilities for those handling it.

We will also make available in the near future the streptomycin antibiotic for use in agriculture.

E. D. Witman
Columbia Southern Chem. Corp.
Pittsburgh, Pa.

IT is reasonable to believe that increased sales of agricultural chemicals for the 1955 season will depend upon both educational and promotional type information, directed to the farmer, the dealer, the county agent, and even the banker. Such a program should be based on educational advertising, motion pictures where possible, still pictures if available, and pamphlets.

Also, great encouragement should be offered to state and federal experts to publish *their* latest and best information on the use of agricultural chemicals, giving a true description of the economic gains and the possible savings that the use of agricultural chemicals will bring to the farmer.

In regard to the chemicals which we manufacture, Chloro IPC is finding much wider uses on vegetables such as onions, and leafy crops such as spinach, lettuce and kale. These uses are developing particularly along the eastern seaboard and in the heavy onion growing areas of Wisconsin, Indiana, New York, and Texas.

Another developing use for Chloro IPC is in grass and weed control in fruit and forest nurseries. In this instance, excellent results have been obtained in several areas where Chloro IPC has been applied as directed sprays onto the ground both in the dormant season and during the growing season.

A new and interesting use for Chloro IPC is in peach thinning in which a rather dilute spray is applied to the peaches at the time of blossoming. A somewhat related use is that of spraying such crops as sugarcane and lettuce to prevent the formation of flower stocks. Another new possible use for Chloro IPC calls for dipping the tubers in a 1% solution in order to extend the normal dormant period of the potato.

The most recent news on regular IPC is the excellent possibility of controlling wild oats through a preplanting treatment with this herbicide. Wild oats may well be called "North America's Number One Weed Problem." There are literally hundreds of thousands of acres of valuable agricultural land in the north central part of the United States and in the prairie provinces of Canada infested with this serious weed. If tests now under way prove successful, the use of IPC may mean a great step forward in agriculture and a profitable new market for the agricultural chemical industry.

BHC has been successfully used for the last several years for control of corn rootworm and spittlebug. Both these markets are developing and are expected to grow to a reasonably large volume over the period of the next few years. The corn rootworm area coincides with the heavy corn growing areas of the United States and the spittlebug area is roughly those states around the Great Lakes area. Another use for BHC which has not yet reached a volume stage is the control of various wood boring insects such as the ambrosia beetle in cut logs and lumber. If this use is properly promoted, a very large market for BHC could be developed.

T. W. Hatch
Shell Chemical Corp.
Denver, Colo.

FOLLOWING federal acceptance of dieldrin for household use last fall, nearly every phase of agricultural, industrial and home pest control can now be handled by Shell Chemical Corporation's agricultural chemicals: aldrin, dieldrin, endrin, A-A Weed Seed Killer and D-D®.

Dealers everywhere are now potential outlets for formulations of these products, with the unlimited market available in 1955. For instance, small package dieldrin mixes for household pests, together with dieldrin-fertilizer combinations or other mixtures for lawn and garden, make a dual approach possible to the vast home consumer field.

This broad market for Shell agricultural chemicals came about

through the vigorous product and sales development program of the company. It was achieved in cooperation with federal and state workers and followed extensive research, which resulted in widespread recommendations for the use of Shell insecticides.

Formulations of aldrin and dieldrin for field and home use achieved a new high in use and acceptance with the relaxation of warning and precautionary statements and the elimination of the "skull and crossbones" from practically all commercial formulations by the U. S. Department of Agriculture. This relaxation has stimulated the acceptance of aldrin and dieldrin by formulators and consumers alike.

A highly qualified field staff, carrying out Shell's technical service program, gives top scientific service to formulators in producing their products. For example, the development of stabilized dusts of all products and stabilized dieldrin wettable powders with high suspendibility was a marked advance in the formulation of Shell products, and contributed greatly to their acceptance, not only in the United States, but world-wide. The field staff and technical service program also helps formulators get label clearances and keeps them informed on new recommended uses for the versatile Shell agricultural chemicals.

To meet the needs of an ever expanding insecticide and soil fumigant market, Shell provides an aggressive advertising and sales promotion program. A portion of Shell's advertising program is done on a contractual cooperative basis with the formulator, which is a new trend in merchandising agricultural chemicals. Advertising, publicity and literature are designed for formulator and dealer consumption, along with an educational sales campaign slanted to the consumer. This program keeps formulators posted with up-to-the-minute information, and makes the consumer familiar with the Shell chemicals contained in the formulators' products.

*Registered Trademark

Carlos Kampmeier
Rohm & Haas Company
Philadelphia

THE use of Dithane fungicides to control cotton seedling diseases, expanded applications of Karathane fungicide and miticide, two new agricultural emulsifiers and additional development of Perthane are important new features of the Rohm & Haas pesticide program for 1955.

Three years of experiments and trials in cotton fields of California and Arizona with soil application of Dithane Z-78 and Dithane D-14 have demonstrated the effectiveness of these fungicides in controlling seedling diseases that cause irregular stands and reduce yields. Comparison of treated versus untreated plots has shown yield increases amounting to 400 to 1000 pounds of seed cotton per acre, with corresponding increases in value of $50.00 to $100.00 per acre over untreated plots. The commercial development of Dithane soil applications is being limited to California and Arizona in 1955, with demonstrational work continuing in other cotton growing areas.

The unique ability of Karathane WD to control powdery mildew on apples, melons, cucumbers, ornamentals and other crops has created widespread interest in this material. With confirmation of the miticidal properties of Karathane and with the approval of Federal authorities for use of Karathane on certain food crops including cucurbits, it is expected that distributors and formulators will find Karathane a valuable addition to the group of crop saving pesticides.

Two recently developed emulsifiers—Triton X-151 and Triton X-171—are designed to provide outstanding emulsion performance for a wide variety of toxicant-solvent systems over a broad range of water hardness conditions. These emulsifiers can be used alone for some formulations, or they may be blended in simple ratio for others. This enables formulators to adjust for changes in solvents or for specific water hardness conditions. Equally important is the fact that they simplify emulsifier inventory problems.

Perthane, an experimental insecticide presently under development, shows excellent promise for controlling apple maggot, cherry fruit fly as well as certain pests of lettuce and forage crop insects. Perthane has a high degree of safety to warm blooded animals, thereby raising the possibility of applications close to harvest. It is anticipated that work presently under way will justify commercial application of Perthane during the coming year.

George W. Hill
Chemagro Corporation
New York

CHEMAGRO Corporation, which markets products developed in Germany by Farbenfabriken Bayer under an agreement with that company, will continue to expand its product and research program this year. Such investigations are directed toward the extension of agricultural uses of the systemic insecticide, Systox, and toward the development of usage fields for several new insecticides.

During 1954, Systox was accepted nationally for the control of mites and aphids on various food crops, including apples, potatoes and English walnuts. Field research has indicated the practicability of using Systox on certain additional agricultural crops, for effective and economical protection against numerous major mite and aphid species.

Developmental work will continue with Chlorthion and Meta-Systox, and in additional potential usage fields for the new phosphate insecticide, Dipterex (Bayer L 13/59). Special Dipterex formulations are being made commercially available for the control of flies in the household, dairy barns and farm out buildings; and for roach control by pest control operators.

Scott James
Pittsburgh Coke & Chemical Co.
Pittsburgh, Pa.

A SERIES of bulletins designed to aid in educating the salesmen of our distributors will be an important feature of Pittsburgh Coke's "dealer aid" program this season. In addition, we will offer less technical and more popular type bulletins for consumer distribution. Both the consumer and the dealer bulletins are further broken down into separate literature for brush killers and weed killers. Supplementing this bulletin service we have prepared for distributors and dealers a large herbicidal control chart which at a glance gives complete recommendations for the control of weeds and brush, type of material to use, time of application, etc. These charts are offered in two sizes, one for display by the dealer and distributor, and a smaller one in bulletin form which can be used as a piece of literature for the dealer to hand out to users.

We are making heavier use of a consumer advertising program this season. We offer newspaper mats for our distributors and dealers.

In the pesticide field we are featuring a big promotional program to introduce our new fly-killer, Dipterex-199. Higher profit margins are offered to the dealer and distributor. To further encourage their promotion of this new product we are offering advertising allowances, so much per case to spend for advertising for every case they sell. Consumer literature, window streamers and wall posters are supplied to dealers, and as in the case of our herbicide program we are offering advertising mats to dealers and distributors which will facilitate their supplying copy for local advertising. Dipterex will be packed in a special display carton which will itself wear an outside protective carton so the inner carton will always be in good shape for display when it reaches the dealer. Distributors' salesmen will be supplied with small packet samples of the product to be handed out to users for trial purposes.

Herbicidal and insecticidal sales efforts will be further backed up by a promotional booklet supplied to dealers and distributors and intended as an educational piece for salesmen for these outlets. In addition to the booklets we also give each dealer a small wallet which carries our sales story in compact form and should help encourage the dealers and their salesmen to promote the use of agricultural chemicals.

S. K. Chestnut
Niagara Chemicals Div.
Food Machinery & Chem. Corp.
Middleport, N. Y.

AS each new year rolls around, every business organization should have already under way, substantial plans and development ideas to foster as an end result, a better economic position for itself. To neglect such a forward approach would result in stagnation. We all are well aware of the fact that an organization must go forward. To stand still is to digress.

To better help its own position in the economic picture, Niagara Chemical Division will re-emphasize its classification as a service industry during the current year. When we better serve our customers for the improvement of their welfare, it will reflect in a sounder economy for all.

For the coming season, Niagara will stress service to agriculture in its sales efforts. The complex chemical aids to better farming are numerous. The numerical figures which are compiled each year by government agencies point out the tremendous losses to growers thru insect and disease damage to crops, and the loss of crops to weeds. The gap between losses and measures to prevent them is a challenge to the agricultural chemicals industry. Many of the growers problems are already solved, but the answers have not been taken to the source. This can well be done by representatives of the industry along with state and federal agricultural workers. Here lies a great sales potential.

Beyond the scope of personal sales contact are several sales tools to

(*Continued on Page* 117)

Max R. Sias
Michigan Chemical Corp.
Wyandotte, Mich.

AS basic producers of methyl bromide, Michigan Chemical Corporation is vitally interested in the many ramifications of the government grain sanitation program now in effect. Since methyl bromide has already proved itself as an efficient and economical fumigant for many other commodities, it was quite natural that this product should receive considerable attention when experimental work was begun on the recirculation system of fumigating bulk grains. In this type of operation the air is withdrawn from the floor area of the storage tank or bin and returned via a duct to the head space above the load. When circulation has been established, methyl bromide is introduced into the cycle and drawn through the grain, resulting in an even distribution and consequently, an effective kill. Several experiments have already been completed and the results are

(*Turn to Page* 115)

J. F. Kirk
Velsicol Corporation
Chicago, Ill.

VELSICOL looks forward to an excellent sales year for its agricultural insecticides, particularly heptachlor. This in effect means that we expect our formulators and their distributors and dealers to have a banner sales year with Velsicol insecticides.

The heptachlor picture looks very good. In those areas where farmers have had experience in using heptachlor previously, they are definitely sold on the results. Here are the best prospects for immediate heptachlor business. On the other hand, heptachlor is being introduced in new areas which will result in an expanding market for formulators and dealers.

Thru the efforts of the Velsicol research department and the results of countless field experiments, many more U.S.D.A. recommendations have been received on heptachlor. For example, just recently recommendations

(*Continued on Page* 115)

SLOWLY AVAILABLE FERTILIZERS

THE fertilizer industry is a tremendous one, and, consequently, developments which play only a small part in it percentagewise may still assume an important industrial aspect. Fertilizers in current use are such that they make plant food available immediately on application to the soil. Their availability does not necessarily correspond with requirements of plants at the time the plants need food for growth. There is therefore an interest in slowly available fertilizers, especially those with an availability during a growing season which might be coordinated with requirements of plants over the various months of the growth cycle.

The following data give an idea of the target at which such products are aimed:

In the fertilizer year ending June 30, 1953, 23,412,608 tons of commercial fertilizer were consumed: 1,637,066 tons of N, 2,270,750 tons of P_2O_5 considered available to plants by tests currently used (and 497,240 tons P_2O_5 considered unavailable), and 1,740,210 tons K_2O. Fertilizers supplied also the secondary elements Ca, Mg and S; as well as the trace elements Fe, Mn, Cu, Zn, Mo and B. Most of these trace elements were supplied "accidentally" with the major fertilizers, although in themselves the trace elements are important commercial products used in a volume of about 100,000-200,000 tons per year and worth $10,000,000 or more.

Two disadvantages of the soluble or immediately available fertilizer are the soluble fertilizer is sometimes washed out of the soil . . . as in the case of nitrogen and some of the trace elements . . . or (2) the fertilizer may become unavailable due to reversion to an insoluble form or reaction with the soil (P_2O_5), or even due to adsorption on the soil complex (for example potash, although adsorbed potash has a fair degree of availability). The ideal slowly available fertilizer would be one which is held in a stable form when not needed and converted to a soluble form when needed. It would be even better if the fertilizer could be placed in the soil in quantities sufficient for several years crop growth . . . part becoming available in portions each spring and summer, while the remainder remained in a stable, inactive form for later consumption. Production of such a material is far beyond present technology or science. However, it is interesting to note that while a large portion of "available" P_2O_5 added to the soil each year is converted to "unavailable" P_2O_5 and hence has no value that year, a modest portion of the "unavailable" material remains slowly available to the crop in succeeding years.

Slowly Available N Fertilizers

THE slowly available nitrogen fertilizers have received considerable attention in recent years. which is partly due to the fact that nitrogen leaching from the soil is a serious problem, especially in the warm, humid climate of the South. And partly because the natural organic fertilizer materials (which are a slowly available fertilizer) command premium prices.

Most of the slowly available synthetic nitrogen fertilizers are urea-formaldehyde condensation products.

The ideal slowly available fertilizer would be one which would be held in a stable form when not needed . . . then converted to a soluble form when needed. Fertilizers may eventually be developed which can be placed in the soil in quantities that are sufficient for several years of crop growth.

By J. D. Joffe
Columbus, Ohio

However a limited amount of work has been done on the diamide of oxalic acid, called oxamide (Joffe & Beckham [to Allied Chem. & Dye] U. S. Pat. 2,646,448). The urea-formaldehyde compounds used, or intended, for fertilizers are far different from ordinary urea-formaldehyde resins. Urea-formaldehyde resins are normally high molecular weight materials having approximately 1.5 molecules of formaldehyde for each molecule of urea. The fertilizer materials have in most cases less than one molecule of formaldehyde (e.g. 0.7) for each molecule of urea. Because of the small mol ratio of formaldehyde, it is structurally impossible for them to form real resins.

In formulating such materials the chemist is faced with contradictory requirements. He wants a material which is slowly available (but which will become 100% available if sufficient time is allowed). However, such a slowly available nitrogen may not pass the A.O.A.C. (Association of Official Agricultural Chemists) test, which measures the amount of NH_3 liberated when water-insoluble nitrogen fertilizer is treated with neutral $KMnO_4$. It is considered highly desirable for commercial use that at least 80 per cent of the nitrogen be liberated as NH_3 under the test conditions. (The test was devised many years ago to limit the use of organic materials, e.g. leather scraps, which did not serve as useful sources of nitrogen).

The U. S. Dept. of Agriculture has done a considerable amount of work on these urea-formaldehyde materials. Clark, Yee, and Love* reported on a series of ureaform products. They state that the availability of such products is largely determined by the mol ratio (urea: formaldehyde) and N solubility index, and that the lower the ratio or index, the lower the availability. Other USDA workers** state that ureaform could be applied at the rate of 200-800 lbs. contained nitrogen per acre. But that if such a high rate is used with soluble fertilizers, the growing plants will be killed or severely injured. Ureaform is reported to be especially good for long-season crops, particularly turf. While turf is not, of course, an important commercial crop, large amounts of fertilizers are used to grow it by home owners, parks, and golf courses.

Rohner and Wood† used 0.75-1.25 mol ratios of urea to formaldehyde at 40-75° and pH 3-5 to give a product having an activity of at least 80 per cent by the neutral $KMnO_4$ test. Another Allied investigator†† worked at a very low pH, 0.9-1.7, a mol ratio of 2.5-4 urea: formaldehyde, 0.5-1.5 hrs. and 25-45° to produce a material containing 40 per cent total nitrogen, 85 per cent of which was water insoluble. The urea: formaldehyde ratio in the product which precipitates from the starting solution is considerably lower than in the solution itself.

Kralovec & Huffman of du Pont (U. S. 2,592,809, Apr. 15, 1952) used a two-step process involving successive reactions at pH 9 and pH 3. Their product contained a total nitrogen content of 40.5%, was made from 1.5 mols urea per mol formaldehyde and had 61.5% of the nitrogen in a water-insoluble form. About 60 per cent of this water insoluble material was available to growing plants in a 6 month period.

Other patents are held by Swift (Davenport, U. S. 2,618,546, Nov. 18, 1952) and by French workers (Patry et al Fr. 956,459). Surprisingly, the only published announcement of commercial production of a solid urea-formaldehyde fertilizer was by the Warwick Chem. Co., New York. There have been no reports on the present extent of commercial production.

On the basis of published information on the costs of urea and formaldehyde, raw material costs per lb. of contained nitrogen in a urea: formaldehyde product are 40-50% higher than in urea itself. To this cost, must necessarily be added the cost of manufacture.

It is interesting to note that one of the earlier processes for synthetic nitrogen, produced a product which was water-insoluble. This is the Serpeck process which operates at 1200-1600°C to produce AlN from bauxite, carbon, and producer gas (70% N, 30% CO). The product has been tested for use as a fertilizer, and although small amounts of NH_3 were produced, the material is practically worthless due to slow decomposition in the soil. The Serpeck process was operated commercially for several years around 1910-1915 in France and the U. S., the AlN produced being converted to NH_3 by reaction with NaOH. It is just barely possible that AlN would prove useful under the conditions of the American South, over the course of a full growing season. The rate of decomposition to NH_3 would be expected to be considerably faster at the 81-83°F July temperatures in the South, rather than the 65°F temperatures in Germany,

*Ind. Eng. Chem. 40, 1178-82 (1948)
**Agronomy Journal 43, 123-7 (1951)
†To Solvay Process Div. of Allied Chem. & Dye, U. S. 2,415,705.
††Kise, U. S. 2,644,806, July 7, 1953.

where AlN was tested and found wanting. While conditions for producing AlN are very severe, the electrical consumption required was reported to be somewhat lower than for calcium cyanamide (70 g. nitrogen per kw. hr. were obtained vs. only 45 gr. nitrogen as calcium cyanamide.).

Slowly Available P_2O_5 Fertilizers

THERE have been no published reports on the production of slowly available phosphate fertilizers. Rather the problem has been to obtain materials which are available. Natural phosphate rock sells at perhaps $6.00 per ton, and small amounts of this are used directly on the soil. Most phosphates, however, are treated with sulfuric acid to form superphosphate. This material having a lower total phosphate content but a far greater availability sells at about $18.00 ton for the 22% a.p.a. grade. When phosphate is applied to the soil, part is used by the crop, but part, perhaps more than half, reverts to an unavailable form. According to Kittrick & Jackson of the U. of Wisconsin* some of this unavailable phosphate becomes slowly available to the crops in succeeding years.

Slowly Available K_2O

THE production of slowly available potash does not appear to be a likely field for development. Potash is always applied as a soluble salt. Some of this is adsorbed on the soil complex. This adsorbed material is still available, although to a somewhat less extent than the potassium of the KCl or K_2SO_4 added originally.

Secondary Elements, Ca, Mg, S

NO work has been done on slowly available forms of the secondary elements calcium, magnesium or sulfur. It is worth noting that lime, the source of the calcium, is used largely to control the soil acidity and, therefore, has an important effect on the availability of other elements, particularly phosphorus, and the trace element metals. In general, metallic trace elements are less available to plants if the soil is alkaline, and consequently, overliming is now recognized as a serious agricultural problem.

Agricultural Chemicals, Dec. 1954, p. 49.

Slowly Available Trace Elements

THE trace elements or minor elements are present in the plants in only small amounts. They are just as essential as N, P_2O_5 or K_2O. Despite the fact that only small amounts are needed for the plants, large amounts must often be added to the soil to make these minor amounts available to the plants. This is due to their tendency to become unavailable due to soil reaction. This statement does not apply to boron, but the latter may become unavailable due to leaching. The metallic trace elements are iron, copper, zinc, manganese, and molybdenum (existing as molybdate); while the only non-metallic trace element is boron (existing as borate). Vanadium has been recently shown to be an essential element.

Accurate figures on total trace element consumption do not appear to be available. In 1951, 16,000 tons of manganese sulfate were used in mixed fertilizers, while 40,000 tons of other trace elements were used in mixed fertilizer according to USDA estimates. The USDA also furnishes data on use of the elements in direct soil application, but the figures look somewhat low and may be incomplete. At present, most soil is not intentionally treated with trace elements, but that which is treated often receives large amounts: 10-200 lbs. copper sulfate per acre, 20-40 lbs. zinc sulfate, or up to 200 lbs. manganese sulfate. In order to prevent loss due to unavailability, the trace elements may be applied directly to the foliage as a spray. A newer idea is to apply the elements, especially iron, with a sequestering agent which keeps the ionic concentration of the iron so very low that no reaction with the soil occurs. The iron is sequestered with ethylenediamine tetraacetic acid (usually made from ethylene diamine, formaldehyde, and hydrocyanic acid). Commercial products of this nature are: Sequestrene (Geigy), Tetrine (Glyco), Nullapon (Antara), and Versene (Dow).

Slowly available trace elements have been produced commercially by the Ferro Enamel Co., in the form of "Fritted Trace Elements" containing a mixture of boron, iron, manganese, copper, zinc, molybdenum and iodine (not essential for plants but essential for the humans eating the plants). This product is made by fusing together the salts and then breaking up the melt by dropping it into water . . . a method similar to that used in making glass frit for porcelain enamel. The product is not readily soluble in the soil water; hence the trace elements are not leached from the soil; neither do they become unavailable due to reaction with the soil itself.

The difficulty with the use of such a mixed material is that the farmer would spend money needlessly in applying all the trace elements to a soil which is not deficient in more than one or two of the nutrients. This argument would not apply to the use of such materials by home gardeners where convenience is more important than the cost of the small quantities of fertilizers required for garden crops. Except for boron, the use of excess trace elements is probably not much of a hazard.

It may be possible to market slowly available trace elements in the form of a matrix with natural or synthetic organic fertilizers. Only a limited amount of work has been done on the formulation of such materials, and the research did not involve any agronomic tests. Such materials would not be organic fertilizers containing minor amounts of trace elements, but metallic and non-metallic compounds (soluble or insoluble) held in a matrix of slowly available synthetic or natural fertilizer. When first placed in the soil, no leaching or unavailability due to reaction with the soil could occur; in time with the breakdown of the organic matrix the compounds would become available, preferably at a time when they could be utilized by the plant. As noted above, a few formulations have been made involving either a single trace element or several trace elements.★★

WHAT'S A PATHOLOGIST?

By Paul R. Miller

PHYTOPATHOLOGISTS, plant pathologists, plant doctors—by whatever name you know them—they are the men and women who make a career of protecting this nation's agricultural productiveness. They number about 1,500; all fundamentally concerned with the prevention or control of 30,000 different diseases of our economic plants. Their's is a world of leaf spots, wilts, blights, rusts, scabs, rots, and galls that annually cost the United States economy an estimated $3 billion.

Our food, our clothes, our homes—these very necessities of life are the province of American phytopathologists. From radishes to redwoods, they have set for themselves the task of putting an end to the more or less "tolerated" food and fiber yield reductions caused by disease. Through research, education, production, and service, they provide growers with the understanding and methods that enable them to whittle away at the 10 per cent of all production claimed by plant disease.

Moreover, phytopathologists in this country and others as well are constantly adding to their knowledge of how to prevent disease epidemics. With their know-how, their modern equipment and materials and their organization that maintains an up-to-the minute appraisal of plant disease conditions the country-over, it is unlikely that in the United States disease will ever cause famine as did late blight of potatoes in Ireland, or that great areas will be forced out of production of a crop as was coffee-producing Ceylon by a rust. It is only fair to add that both these events happened a hundred years or so ago, before much was known about plant diseases anywhere.

The science of phytopathology as we know it today is a relatively young fellow who is trying with a youth's enthusiasm—and a great deal of success—to relieve some of the world's old, old complaints.

On the other hand, plant diseases are not new. Undoubtedly their effects were observed by the first of our ancestors who scratched the ground with a stick and dropped into the furrow the seeds of wild plants. Certainly we know that man's interest in sick plants dates back to earliest recorded history, because the Old Testament refers to blights, rusts, and mildews. The Romans paid homage to the rust god Rubigo in the hope of persuading him not to ravage the grain fields.

Even though the place of plant diseases as destroyers was recognized thousands of years ago, their scientific study progressed at a slow pace. Prior to the 19th century, there was little more than a gathering together of facts about diseases, some study of their physiology, and attempts to classify them. It was barely a century ago that the widely-held belief that disease was spontaneously generated by plants was effectively demolished by the publication of a book reporting the smut and rust fungi studies of a German, Anton de Bary. This revealing work earned de Bary the title of Father of Mycology.

In 1858 another German, Julius Kuehn, published the first book on the general subject of plant pathology, discussing in it the nature, types, and causes of important economic diseases of plants.

Less than 30 years after the appearance of Kuehn's book, America took its first important step in the establishment of phytopathology as a science and a profession. In 1885, a Section of Mycology was set up under the leadership of F. Lamson Scribner in the Botany Division of the U. S. Department of Agriculture. Two years later, still under Scribner's direction, functions of the section were broadened to include all vegetable pathology.

Although the first instruction in phytopathology was begun at the University of Illinois as early as 1873, the first department was organized at Cornell University in 1907 under the guidance of H. H. Whetzel. The University of Wisconsin established a plant pathology curriculum in 1909.

In this same year (1909) in Baltimore, at the annual meeting of the American Association for the Advance of Science, 50 plant pathologists organized the American Phytopathological Society—a society that today includes nearly every active phytopatholigist in the United States in its membership. The first chairman was L. R. Jones.

Passage of the Plant Quarantine Act by Congress in 1912 added further strength to this rapidly growing profession. This legislation against the introduction of foreign plant diseases and insects lost the United States its title of nursery dumping ground of the world.

In addition to the writings and work of de Bary and Kuehn, two other 19th century European events were destined to become milestones in phytopathology's road of progress. One was the development of the first important fungicide—bordeaux mixture—by Pierre Marie Alexis Millardet in 1882. At the time this copper-based fungicide saved France's vineyards from the ravages of the American downy mildew fungus. Its fame spread, and in a short time bordeaux mixture was in use the world-over. The second occurred in 1886 when another German, Adolph Meyer, proved through his work with tobacco mosaic that viruses were a cause of plant disease.

The first comparable American contribution to the science was the discovery by Thomas J. Burrill of the University of Illinois that bacteria cause plant disease. Burrill's work, reported on between 1878-84, proved that fire blight disease of pears and apples is caused by a microscopic bacterial organism—the first of 170 different kinds of disease-causing bacteria now known to phytopathologists.

A notable fungicidal development in the United States occurred in 1906 when A. B. Cordley of the Oregon Agricultural Experiment Station proved that a mixture of lime and sulfur could effectively and safely be sprayed on the foliage of apple trees to prevent scab. In 1907, W. M. Scott, of the U. S. Department of Agriculture added to the value of this discovery with his development of the self-boiled lime-sulfur mixture that was successful in preventing scab and brown rot of peaches. By 1912, lime-sulfur had practically replaced bordeaux mixture as an apple fungicide in this country.

Another USDA researcher, W. A. Orton, is credited with arousing the interest of phytopathologists and other scientists in plant breeding as a method of combating disease. His work from 1899 to 1909, developing melons, cotton, and cowpeas that were resistant to Fusarium wilt, was the beginning of resistance breeding research that each year is extended to include more disease-susceptible crops.

Plant rust-resistant wheat varities with destruction of barberries (the alternate host plant of the stem rust fungus) has cut damage from this disease by more than half in 18 cereal-producing states.

On the list of major achievements in American phytopathology should be included the seed treatment methods pioneered by H. B. Bolley of the North Dakota Agricultural Experimental Station. Bolley's success in protecting flax seed from soil-infesting disease organisms with a formaldehyde treatment led to a method of disease control that is now practiced with many crops.

The at least 30,000 diseases of plants that are the concern of our plant pathologists today are classed as either non-parasitic or parasitic diseases. Non-parasitic diseases develop from natural causes—for example, too much or too little rainfall, sunshine, or plant food, or some inherent abnormality of the plant itself. The plant pathologist learns to read the signs of such diseases, and where he can, he offers recommendations so that they need not occur. Today's phytopathologist can tell the western tomato grower, who depends on irrigation, when and how much water to apply to his crop to avoid blossom end rot. Working with the soil scientist, he can advise fertilization practices that will help the growers of many crops to avoid nitrogen, phosphorus, or potash deficiency diseases.

The parasitic diseases present an entirely different problem. With these the scientists are dealing with plants attacked by organisms so very small as to be invisible to the unaided eye, except for some of the fungi. These organisms are classed in the four main groups of nematodes, bacteria, fungi, and viruses. Myriad kinds in all these groups are already known, and additional ones are constantly being discovered. Almost any plant is subject to attack by one or more of these parasities.

The parasitic diseases affect twigs, foliage, stems, fruits, flowers, and roots. No plant part is immune. Some destroy crops in hot weather, others in cool, some when it is dry, others when it is wet. All the possible combinations of weather aid attack by one disease or another.

Some of the organisms that cause these parasitic diseases can penetrate perfectly healthy plant surfaces. Many can enter only through wounds or scars, or weakened or drying plant parts. Still others, including most of the viruses as well as many bacteria and fungi, must be introduced directly into the plant, by insects mainly.

Infection spreads in various ways. Some of the parasites are windborne, or carried by insects or other animals. Some are present in the soil. Affected plants, seed, or soil transported to near or distant places may initiate a new disease threat to crops in the new location.

They have great adaptability. Witness the hundreds of races and sub-races of cereal rusts that worry the farmer today. No sooner do phytopathologists and plant breeders develop a variety resistant to a prevailing race of rust than another race appears as a new threat.

Though it may appear that they are faced with insurmountable odds, the phytopathologists are making remarkable progress in determining the causes and understanding the factors that contribute to the destructiveness of plant diseases. They have furnished to growers the methods and materials that will prevent many of these diseases from occurring. Today there are more than twice as many active phytopathologists as there were 25 years ago; nearly every land grant college and several universities have curriculums in this science, and all state agricultural experiment stations are staffed with phytopatholigists. In the U. S. Department of Agriculture many of these scientists do research concerning the diseases of cereal, forage, and horticultural crops and forest trees. The Department and the States support a cooperative plant disease survey and warning service that keeps growers in all parts of the country apprised of disease conditions, and by forecasting probable occurrence, helps these growers avoid or prevent losses to disease. Other phytopathologists serve in important roles with industry, in the development and testing of new control chemicals, and in specialized jobs with nurseries and seed growers, in canneries, grain elevators, and food packing and shipping businesses. Also, some few have etablished themselves in private practice as "plant doctors."

Their knowledge continues to grow. Since World War II, phytopathologists in the United States have aided in development and expanded use of the new organic chemicals.

Millions of tons of these materials are being used each year by growers who have learned the importance of preventing plant diseases.

(Continued on Page 131)

Phosphate Insecticide Research

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THE mechanism of action of organic phosphates in biological systems is relatively much better understood than that of other chemicals used as pesticides. It was recognized around 1940 that certain organic phosphates inhibit enzymes of the cholinesterase group. The function of cholinesterase in the organism is believed to be the destruction of acetylcholine, the substance which transmits certain nervous impulses to the effector cells at the neuromuscular junctions. Figure 1 is an attempt to demonstrate the function of acetylcholine and cholinesterase in a simple manner, namely, by comparing the effector cell at the neuromuscular junction with an electric motor. In this comparison, which has, of course, to be taken with a grain of salt, like all similitudes, acetylcholine would be comparable to the electric current, which is transformed into mechanical energy by the motor. As a result of acetylcholine stimulation, the motor equivalent, namely, the effector cell, effects muscular action. Cholinesterase in this comparison would be the equivalent of the rheostat controlling the motor.

It is generally assumed today, as a result of extensive research conducted in several countries, that organic phosphates are hydrolyzed by cholinesterase in the same manner as acetylcholine (3), and that they competitively occupy one of the two sites in the enzyme at which the acetylcholine hydrolysis normally takes place. The phosphate-enzyme complex, however, unlike the acetylcholine-enzyme complex, is quite stable, thus making the enzyme unavailable for its natural function. This results in an accumulation of acetylcholine at the neuromuscular junctions, which is believed to be principally responsible for the various symptoms that have been observed to be associated with organic phosphate intoxication in experimental animals, as well as in cases of accidental human poisoning. Several authors, therefore, express the opinion that in essence, organic phosphates effect an acetylcholine intoxication of the organism (13).

The acetylcholine hydrolysis in the normally functioning organism occurs as shown in Figure 2 below (13).

The combination of acetylcholine with the enzyme, as well as the subsequent dissociation of this complex into hydrolyzed acetylcholine (i.e., choline and acetic acid) and active enzyme takes place rapidly. Turnover is rapid, therefore, and relatively large amounts of acetylcholine can be hydrolyzed in short periods of time.

A dialkyl phosphate of the paraoxon-type has been chosen to illustrate the assumed mechanism of phosphorylation of the enzyme (See Figure 3). The dissociation of the phosphate-enzyme complex into enzyme and the dialkyl phosphate-rest takes place very slowly,—so slowly that the enzyme inhibition by organo-phosphates has been believed to be irreversible (1). Recent evidence has proved, however, that the differences betwen enzyme inhibition by organic phosphates and inhibition produced by physostigmine

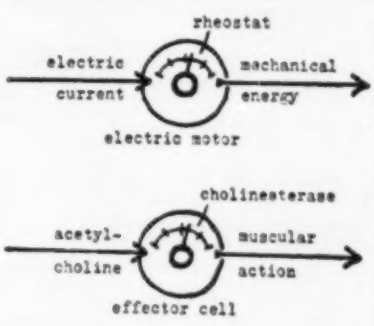
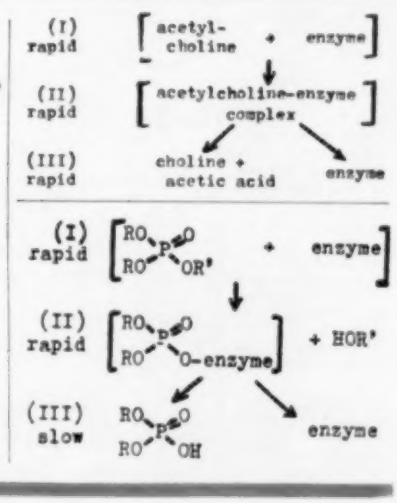


Figure 1—Above
Figure 2—Top right
Figure 3—Bottom right



*Before the Entomological Society of America, Houston, Texas, Dec. 8, 1954.

and related compounds are only quantitative in nature (13). It is interesting to note that step II in figure 3 has to be preceded by some sort of an interaction between the triester and the enzyme (step I). Dialkyl-phosphoric acid is not capable of directly combining with the enzyme, it is physiologically inactive. Also inactive are such triesters as, for instance, triethylphosphate, because they are too stable to be hydrolyzed by the enzyme. Thus, an organic phosphate, in order to be able to inhibit the enzyme, has to possess two properties which appear to be mutually exclusive at first sight: it has to be sufficiently stable to be able to travel inside the organism from the site of administration to the site of action, and it has to be sufficiently unstable to be able to be hydrolyzed by, and thus combine with the enzyme.

It is believed that after phosphorylation has taken place the stability of the enzyme-inhibitor complex is independent of the nature of the group designated as R' in figure 3, because presumably this group has no part in the actual inhibition of the enzyme. Accordingly, the stability of the enzyme-inhibitor complex should only be a function of the dialkylphosphate portion of the molecule, and should be identical for inhibitors with the same dialkyl phosphate group, regardless of whether R' is an aromatic or an aliphatic group (3).

This phosphorylation theory is supported by interesting experiments that were conducted with crystalline chymotrypsine, another carboxylic esterase. The same sort of direct analytical evidence has not been obtained experimentally for cholinesterase to date because this enzyme is not as yet available in crystalline form.

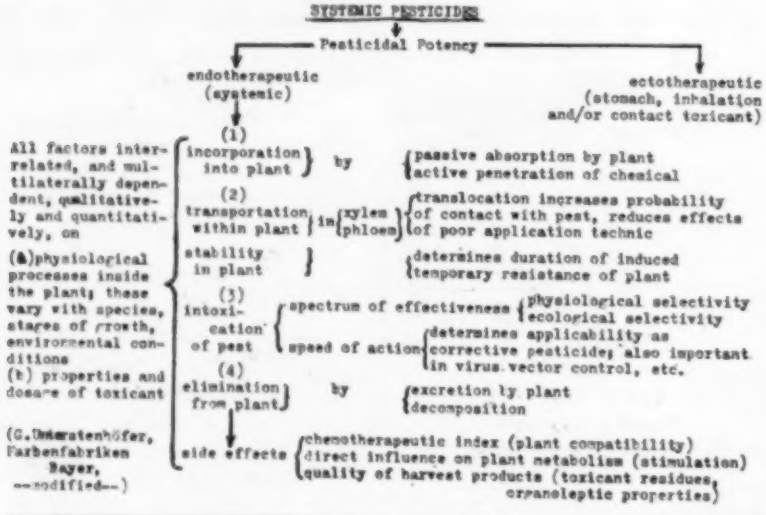
It is known that organic phosphates do not affect acetylcholinesterase only, but that they are capable of interacting with other esterases occuring in biological systems (1). Little is known, however, of the significance of such processes. This is not surprising in view of the fact that the physiological functions of many of these enzymes are not very well understood as yet.

Atropine sulfate and compounds of similiar physiological action are known as antidotes against organic phosphate intoxication in mammals. These compounds do not act against the organic phosphates as such, nor do they destroy acetylcholine or inhibit its formation, but they block the effects of acetylcholine on the chemoreceptors at the effector cell, and thus, on the muscle. In the electric motor example, this might be compared to cutting the wire, thus inhibiting further feed of current to a motor no longer controlled by an intact rheostat. In cases of human poisoning by organic phosphates, repeated high dosages of atropine have proved to be useful. The affected individual has to be kept atropinized until either the accumulated acetylcholine has been destroyed by ordinary hydrolysis, or until the enzyme is reactivated, or, in terms of the electric motor, until no more current is fed by the power system, or until the rheostat again functions properly.

It has been postulated by some that organic phosphates must have a second mechanism of action, different from cholinesterase inhibition, because some of the phosphates exhibit ovicidal properties, and insect and mite eggs were believed not to contain cholinesterase and related enzymes. It has been proved, however, that these enzymes do occur in eggs (6). It is generally assumed that the mechanism of action of the organic phosphates in insects and mites and their various stages of development follows the same general pattern as in mammals, i.e., that enzyme inhibition is the underlying principle. This does not exclude, of course, that other effects or mechanisms of action may not be present, though none have conclusively been proved to exist, as yet.

Compounds of the organic phosphate group that have particularly intrigued biologists ever since they first became known (5) are the so-called systemic insecticides, which represent an entirely new approach to pest control in agriculture. A proper knowledge of the fundamentals, as well as of the important variable elements involved in systemic pest control is not only interesting from an academic point of view, but it is indispensable for the sensible use of systemic pesticides and for an intelligent interpretation and understanding of their performance, their potentialities and their limitations. G. Unterstenhoefer (7, 8, 9, 10, 11) is to be credited for laying the cornerstone to a systematic investigation of the basic principles of systemic pest control. Figure 4 (left) is an attempt to organize the major factors involved in systemic pest control, and to present the interrelations between plant, insect, environment and toxicant in the course of the systemic life of the

Figure 4



(G. Unterstenhöfer, Farbenfabriken Bayer, --modified--)

toxicant. This may be divided into four stages: the incorporation into the plant, the translocation inside the plant, the intoxication of the pest, and the elimination from the plant. It is seen on this chart that many factors, most of which are not simple factors, but complexes of factors in themselves, play a part and are to be considered in this system. The situation becomes more complicated and involved yet when the toxicant is used for the control of virus vectors, in which case a fifth component, namely the virus, enters into the system plant-insect-toxicant-environment (figure 5).

Figures 4 and 5 illustrate how many different disciplines of science are linked together in modern economic entomology. They emphasize the necessity for close cooperation of the entomologist with other branches of biological sciences. The assistance of chemists, physicists, engineers, botanists, virologists, ecologists, biochemists, physiologists, pharmacologists, toxicologists and others is essential for the successful and intelligent use of systemic pesticides.

Among the systemics that are currently on the market, "Systox" (diethoxy - ethylmercapto - ethyl thiophosphate) has acquired wide usage. However, its toxicity to mammals necessitates rigid precautionary measures in its handling which represent a certain limitation to its usefulness. The originators of "Systox" have therefore concentrated their efforts on the development of less toxic systemics. A first result of these endeavors is the development of "Meta-Systox," the dimethoxy-homologue of "Systox." The active ingredient in "Meta-Systox" has an oral acute LD-50 to rats of approximately 80-100 mg/kg, compared to 12-20 mg/kg for "Systox." Tables 1, 2 and 3 give minimum effective dosages for "Systox" and "Meta-Systox" on a number of insects and mites (Table 1), comparisons of relative speed of action of both compounds at equal (Table 2) and at different dosages (Table 3). Field experiments have confirmed and supplemented this laboratory work; their results indicate that it requires, on the average, twice the amount of active "Meta-Systox" per acre or per 100 gals. of spray to achieve the same degree of control as a single "Systox" dosage (12).

A very similar trend may be noted in the field of non-systemic organic phosphates. Several relatively non-toxic organic phosphate insecticides, such as Malathion, Chlorthion and Dipterex, have been developed in recent years, which disproves the idea that high mammalian toxicity is inherent in the entire organic phosphate group. Among these materials, Dipterex also known under its experimental code number Bayer L 13/59 (0,0-dimethyl-1-hydroxy-2,2,2-tri-

(*Continued on Page 131*)

TABLE 1

SYSTOX and META-SYSTOX

Comparative LD-100's for several species of insects and mites (in terms of % of act. in dilution)

	A. SYSTOX	B. META SYSTOX	A : B Ratio
wooly apple aphid (Eriosoma lanigerum)	0.005	0.01	1 : 2
apple aphid (Aphis pomi)	0.005	0.01	1 : 2
potato aphid (Macrosiphum solanifolii)	0.001	0.001	1 : 1
bean aphid (Aphis fabae)	0.0025	0.005	1 : 2
chrysanthemum aphid (Macrosiphum sanborni)	0.0005	0.00075	1 : 1.5
two-spotted mite (Tetranychus bimaculatus)	0.001	0.005	1 : 5
European red mite (Paratetranychus pilosus)	0.005	0.01	1 : 2
mosquito larvae (Aedes aegypti)	0.0005	0.005	1 : 10
vinegar fly (Drosophila melanogaster)	0.005	0.05	1 : 10

(G. Unterstenhöfer, Farbenfabriken Bayer)

TABLE 2

Relative speed of action of SYSTOX and META-SYSTOX at a dilution of 0.025 % (act.)

LT 100 of SYSTOX = 100 (index)		META-SYSTOX
woolly apple aphid	(Eriosoma lanigerum)	80
apple aphid	(Aphis pomi)	90
potato aphid	(Macrosiphum solanifolii)	50
bean aphid	(Aphis fabae)	70
chrysanthemum aphid	(Macrosiphum sanborni)	60
two-spotted mite	(Tetranychus bimaculatus)	50
vinegar fly	(Drosophila melanogaster)	26

(G. Unterstenhöfer, Farbenfabriken Bayer)

Figure 5

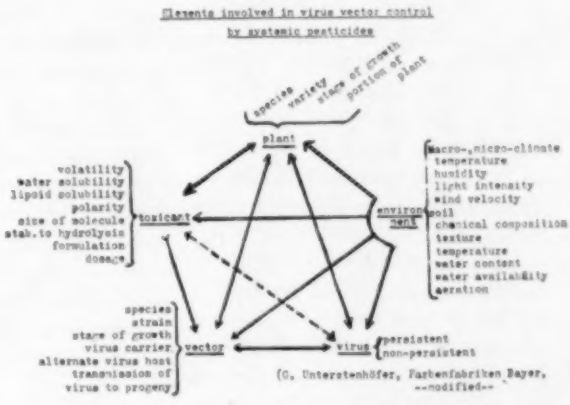


TABLE 3

Relative speed of action of SYSTOX at 0.025 % (act.) vs. META-SYSTOX ta 0.05 % (act.)

LT 100 of SYSTOX = 100 (index)		META-SYSTOX
woolly apple aphid	(Eriosoma lanigerum)	140
apple aphid	(Aphis pomi)	128
potato aphid	(Macrosiphum solanifolii)	100
chrysanthemum aphid	(Macrosiphum sanborni)	90
two-spotted mite	(Tetranychus bimaculatus)	100

(G. Unterstenhöfer, Farbenfabriken Bayer)

Significance of Water Solubility on

PHOSPHATIC FERTILIZERS*

FOR many years, superphosphate was practically the only chemically processed phosphorus fertilizer, and was the principal phosphatic component of physically prepared mixed fertilizers. The degree of water solubility of the fertilizer phosphorus was not a problem while this situation existed. But in recent years several less soluble processed phosphate fertilizers have been introduced, and the methods of producing mixed fertilizers have undergone changes resulting in reduced water solubility of the phosphorus in many cases. In view of these facts, the question arises as to whether this reduction in water solubility has also reduced the nutrient value of the fertilizer phosphorus.

The high quality of water-soluble phosphates has been generally accepted, and there are soil fertility conditions under which this type of fertilizer is recognized to be superior to less soluble ones. Field research in several of our western states has demonstrated that water-soluble phosphates are usually more effective on the calcareous soils of that region. In many vegetable producing areas, where short season crops with high phosphorus requirements are grown, it is generally recognized that the more soluble sources are preferred. More limited research has shown that there are other conditions under which the necessity for rapid availability favors the use of highly soluble phosphates.

It is the purpose of this discussion to review some of the recent research results from the Iowa Agricultural Experiment Station which provide information relative to the subject of water solubility in phosphate fertilizers. Consideration will be given to some of the conditions existing in the Mid-West in which this characteristic in fertilizers may be of importance.

Phosphate Sources for Corn

A LARGE portion of the phosphorus used on the corn crop in Iowa is applied in mixed fertilizers, in the hill or row, at planting time. One of the main objectives of such applications is to promote rapid early season growth. It has seemed logical that the water solubility of the phosphorus might influence the effectiveness of fertilizers used in such a manner. For this reason, a number of field experiments were conducted during the past three seasons to compare phosphate sources of varying solubilities as hill fertilizers for corn.

The phosphorus sources, most of which were experimental nitric phosphates produced by the Tennessee Valley Authority, were compared with concentrated superphosphate as the standard fertilizer. Rates of 15 and 30 pounds of P_2O_5 were applied, using a hand applicator which placed the fertilizer in two portions, one on each side of the hill, at a depth of about three inches below the soil surface. The nitrogen and potassium content of all fertilizers was adjusted to a constant level.

Observations and plant height measurements revealed that there was a remarkably close correlation between the early growth response and the degree of water solubility of the applied phosphorus. Height measurements of plants taken at four locations on about July 1, 1954 illustrate this relationship. Treatment with a 100 per cent water-soluble source had resulted in an average height increase of 10.6 inches over the check treatment, while treatment with a source having two per cent of the total phos-

TABLE 1

Yield increases of corn as influenced by different P_2O_5 sources applied in the hill. (1954 average—4 locations)

Source of P_2O_5	% Water[1] Soluble	Bu./A.[2] Response	% Relative Response (1954)	% Rel. Response (18 sites—1952, 53, & 54)
Diammonium phos.	100%	10.9 bu.	92%	
Conc. super	90	11.8	100	100
Nitric phos. No. 1	41	8.9	75	86
Nitric phos. No. 2	14	7.8	66	64
Nitric phos. No. 3	2	3.4	29	

1 Percent of total fertilizer P_2O_5 in a water soluble form.
2 Average values for 15 and 30 pound per acre P_2O_5 rates.

*Report presented January 17th at the Fertilizer Conference in Ames, Iowa.

**The data presented are from the Iowa Agricultural Experiment Station and acknowledgement is made to John T. Pesek and others who have assisted in its collection. The work has been supported in part by the Tennessee Valley Authority.

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phorus in a water soluble form had given only 1.8 inches increase. Other sources of intermediate solubility had given intermediate growth increases at this date.

These early growth differences have usually resulted in corresponding yield differences at harvest time. The 1954 yield data shown in Table 1 indicate the magnitude of the yield differences in these same experiments. It is evident from these data that the yield increases agree closely with the variation in the water solubility of the phosphorus sources. The nitric phosphate having a water solubility of 41 per cent has been included in all of these experiments and has given an average yield increase equal to 86 per cent of that given by superphosphate. This suggests that the point at which water solubility became a limiting factor probably was above the 40 percent point.

The soils upon which these experiments were conducted were all low in available phosphorus as indicated by soil tests, but did vary in other characteristics such as reaction. The pH of the soils ranged from 5.3 to 7.9, with five of the eighteen having pH values above 7.0. Despite this variation in soil characteristics, the trend with respect to source performance was very uniform. This may be partially explained by the fact that the method of application resulted in very little mixing of the fertilizer and soil. Under such conditions, the variation in performance was largely a reflection of fertilizer characteristics rather than soil characteristics.

In 1953 and 1954, some of the same phosphate sources were tested in experiments in which the fertilizer was broadcast and plowed under for corn. Rates of 30 and 60 pounds of P_2O_5 per acre were used. The soils at all of the experimental sites tested low in available phosphorus, and pH values ranging from 5.5 to 6.8. When the fertilizer was applied in this manner, the advantage for increased water solubility greatly decreased. The yield values shown in Table 2 indicate the magnitude of the source variation. The differences among the source yields were not statistically significant at any of the ten sites studied during the two year period. However, the three most insoluble sources (2 per cent or less) consistently gave one or two bushels less increase than the other sources, a fact which could easily assume economic importance on a large acreage. Apparently, when the fertilizer was mixed more thoroughly with the soil, the degree of water solubility of the applied phosphorus assumed less significance. Also the starter effect from such applications was not a factor of any importance.

TABLE 2

Yield increases of corn as influenced by different P_2O_5 sources applied broadcast and plowed under. (Average—5 locations in both 1953 and 1954.)

Source of P_2O_5	% Water Soluble	Bu./A. Response[1]		% Relative Response	
		1953	1954	1953	1954
Conc. super	90	11.9	7.6	100	100
Ammoniated Super	49	11.2		94	
Nitric phos No. 1	41	11.3	7.4	95	97
Nitric phos. No. 2	35		7.2		95
Nitric phos. No. 3	14	11.1		93	
Nitric phos No. 4	2		6.2		82
Nitric phos No. 5	1		6.4		84
Dicalcium phos.	1	9.6		81	

1 Average values for 30 and 60 pound per acre P_2O_5 rates.

Phosphate Sources for Oats

THE oat crop completes its growth and nutrient absorption in a relatively short period when the soil is cool, and might be expected to respond to increased water solubility of applied phosphates. Limited experimental data from Iowa indicates that there is a tendency for greater response to phosphorus fertilization with the more soluble sources. This has been the observation when acidulated phosphates of varying water solubilities were compared, and when water-soluble sources were compared with water insoluble but citrate-soluble sources.

As in the case of the corn experiments mentioned above, placement of fertilizer for oats appeared to influence the effect of water solubility. The yield data in Table 3 gives an example of the relationship between method of application and degree of water solubility. When the fertilizer was drilled in a band with the seed there was an increase in yield favoring some of the more soluble phosphate sources, but when the fertilizer was broadcast and disked into the soil this difference became less.

Greenhouse experiments with a large number of phosphates also have shown that the oat crop tends to respond in proportion to the amount of water-soluble phosphorus applied. Table 4 gives a summary of the yield results from one of these experiments. The phosphate fertilizers were mixed with the soils, a calcareous Ida silt

Effect of water solubility of fertilizer phosphorus.

The degree of water solubility of the fertilizer phosphorus applied in the hill resulted in these differences in yield increase of corn grown on a Floyd silt loam in Howard County, Iowa. From left to right the yield increases were 3.8, 7.3, 10.8, 12.7, and 13.5 bushels per acre. The check yield was 75.8 bushels.

loam, and an acid Carrington silt loam. The oat plants were harvested at the early heading stage and total dry weight was measured. It is evident from the relative yield values shown in the table that water solubility assumed more significance on the calcareous soil than on the acid soil.

The spread in yield given by sources of different water solubility was much greater in a somewhat similar greenhouse experiment in which only a 20 pound P_2O_5 rate was used. This tendency for water solubility to assume greater significance when low rates of fertilization are used has been observed in both the greenhouse and field.

Fertilizers for Calcareous Soils

THE observation from the greenhouse experiments that water soluble sources were superior on calcareous soils agrees with the research results from western states, as pointed out previously. There has been relatively little field work in Iowa in which acidulated phosphates of varying solubilities have been compared for use on calcareous soils. However, superphosphate has been found to be superior to citrate soluble but water insoluble phosphates in both short and long-time studies conducted on calcareous soils in the western part of the state.

Conclusions

THE experimental results presented above point out the fact that there are conditions under which the degree of water solubility of phosphatic fertilizers does measurably affect crop yields. In 18 field experiments conducted over a three-year period, the effectiveness of the phosphorus in fertilizers applied in the hill for corn has correlated closely with the fraction present in a water-soluble form. The accumulative data indicate that when this fraction became less than 40 per cent, the relative value of the fertilizer dropped sharply. Ten experiments conducted over a two-year period indicated that water solubility was of much less significance when the fertilizers were broadcast and plowed under prior to planting corn.

Less extensive field data show that phosphate sources of high water solubility tended to be more effective for fertilization of oats, particularly when the fertilizer was drilled in a band with the seed. Greenhouse experiments, in which a large number of phosphate sources were compared, also showed an advantage for increased solubility in the stimulation of total plant growth by oats. This effect was the greatest on calcareous soils and when low P_2O_5 rates were used.

Limited field data also have revealed a superiority for water-soluble sources in long-time experiments conducted on calcareous soils.

These results consider only a few of the conditions under which fertilizers are used in the Mid-West, consequently, do not permit the drawing of many broad conclusions. It is recognized that no consideration has been given to the economic implications, to the residual value of the fertilizers, and to the many other factors involved. Additional work is needed to detect and more clearly define the circumstances under which this fertilizer characteristic may be of importance, and to study the economic and other factors concerned.

TABLE 3

The effect of fertilizer placement and water solubility upon the yield of oats. (Yield averages for 2 locations.)

Source of P_2O_5	% Water Soluble	Drilled		Broadcast	
		Yield	Increase	Yield	Increase
		bu.	%	bu.	%
Conc. super	90%	11.6	100	9.4	100
Nitric phos. No. 1	41	11.8	102	7.4	79
Nitric phos. No. 2	35	9.6	83	7.1	76
Nitric phos. No. 3	14	7.8	67	7.4	79

TABLE 4

The effect of phosphate sources upon the growth of oats grown in the greenhouse.

Range of P_2O_5[1] H_2O Solubility	Number of fertilizers	% Relative Yield Increase	
		Ida silt loam	Carrington silt loam
Conc. super — 90%	1	100%	100%
40-100%	6	90	99
20-40%	5	77	88
0-20%	6	69	83

1 40 lbs. of P_2O_5 per 2,000,000 lbs. of soil.

Michigan State in FOA Program

By N. A. Willits and L. Robertson

Top Photo: Response in background from fertilizers applied to potatoes on the Savanna of Bogota. No fertilizer in foreground.

Bottom Photo: Boron deficiency on Berseem clover imported to ascertain its adaptability to Colombia. Left: 20 lbs. borax per acre; Right: no treatment.

THE Foreign Operations Administration program of technical assistance in under developed countries is of major concern to the agricultural chemical industry because of the potential impact of that project on the development of foreign markets. With this fact in mind, *Agricultural Chemicals* (Nov., 1954) has published a description of the purpose and method of the program and are presenting a series of reports, of which this is the second, on particular projects within the program.

To review briefly the main outlines of this program, it involves contracts made under TCA, MSA and ECA, between the U. S. government and land grant colleges. The colleges supply personnel who study the needs of the country, make recommendations, and arrange to train nationals at American universities. The broad objective is to help the country achieve a sounder and more diversified economy.

The project under consideration here was arranged by the FOA during the latter part of 1951 with Michigan State College. Seven technicians were sent to Colombia in Jan., 1952 and assigned to the agricultural colleges of the National University at Medellin and Palmira. They remained there for 18 months. Their primary task was an educational one, pointed at correcting a situation which included a deficiency of leaders and teachers in agriculture. The program involved instruction and curricula, and training of nationals who, after further training at Michigan State College, would return to Colombia and carry out a sound educational and research program. In addition to that teaching responsibility, each staff member had an opportunity to carry out limited research and to travel through various parts of the country.

Use of Chemicals

COLOMBIA imports annually about 2 million dollars worth of pesticides from the United States and ranks in the first ten countries in value of agricultural chemicals imported. Compared to the tremendous need of a tropical area the amount of chemicals used is small. That commercial fertilizers, herbicides, pesticides and other agricultural chemicals are not used in greater quantities then is not because there is no need. The use is relatively low for several reasons, including such factors as inadequate credit facilities, limited lines of transportation and communication, and a deficiency of basic research in agricultural technology.

There is yet great need for studying in regard to the use of many agricultural chemicals and in ascertaining ways to encourage their utilization. Many farmers are simply not aware of the existence of chemicals that could increase the productive capacity of their farms. Even if they were, they could not afford to purchase them. The more well-to-do farmer perhaps realizes the possibility of using some of these materials, but there is little experimental evidence to suggest which product may be needed, how it may best be utilized, and whether or not its use may be expected to be profitable.

Some of the factors responsible for the present low fertilizer use in Colombia may be mentioned as follows: high cost, lack of equipment for application even where the topography permits mechanization, difficulty in maintaining the fertilizer in a good physical condition, and inadequate enforcement of fertilizer laws. In regard to the latter, it may be stated that the existing laws appear to be adequate. However farmers soon lose faith in the product if, as in the case of some, their fertilizer turns out to be sand.

In most of the agricultural areas in Colombia there are two rainy seasons per year. Planting of row crops is substantially limited to these two periods, the planting taking place just prior to the advent of the rainy season. With the increasing moisture supply, weeds also begin to grow and weed control on the water-logged soils is quite difficult. When tractors are no longer able to operate, mule drawn cultivators are pressed into service. When the mules bog down, the ox is called upon, and if it is still too wet, the weeds go unmolested. Herbicides had just been introduced and were on trial use by several sugar plantations in the Cauca Valley in 1953.

Herbicide Use in Colombia

SOME of the most common weeds in the native pastures are woody legumes. No doubt these can be selectively controlled. At present they are removed by hand with a hoe. Other possible uses include weed control on drainage and irrigation ditches, road right of ways, and brush clearing. Considerable research needs to be done along these lines before the future for herbicides can be predicted.

The average life of a fence post is perhaps two years. Suitable facilities for wood preservation would greatly reduce the labor required in fence maintenance. Grain storage is another field entirely unexplored until recently. As the national economy changes, there will be increasing need for grain storage, and methods permitting storage without the considerable losses now experienced will be necessary. To this end the experiences already gained by the National Coffee Growers Federation in storing coffee may prove beneficial.

There are at least two groups now operating in Colombia who do crop spraying and dusting by plane. "Red rice" is a common weed in many of the rice fields. It is difficult to control by management but has been successfully combatted by aerial applications for certain herbicides. Cotton is also dusted regularly in the Sinu and Magdalena River Valleys by air. In the valley and plateau areas where cultivation is quite extensive, there will probably be increased use of aerial crop spraying and dusting.

Disease and insect problems are severe, as would be expected wherever the climate is continuously warm and where moisture is available. Army worms are a real menace to corn; tomatoes, beans and cocoa also suffer from considerable fungus damage. Pink boll weevil is prevalent in the cotton areas. Specialists at the various experiment stations can generally identify insects and diseases. However, lack of sufficient experimentation limits their ability to suggest control measures. In addition, for the most part, farmers show little concern for the damage inflicted by these organisms. Thus education as well as research seem necessary in providing the answers to this situation.

Pest Control on Livestock

THE livestock industry is making rapid strides of advancement. This had undoubtedly occurred in part through the use of agricultural chemistry. Losses due to parasites, insects and disease are especially heavy in tropical regions. Dipping of cattle has come to be common practice in controlling ticks. Frequent spraying is greatly reducing damage caused by the "nutche" fly.

It is certain that as the need for better sanitation is realized, there will be an increased need for materials used for inoculation and disease prevention.

The most widespread use of any agricultural chemical has been that of DDT. Upon arrival in Colombia, it was observed that each house had DDT followed by some numbers stenciled on it. It was later learned that this represented the date on which the house had been treated with DDT. No matter how small or remote the town, it was always possible to buy DDT liquid or aerosol bombs. This indicated to the authors that where a need is shown to exist and where a proven remedy had been dramatically demonstrated, it is adopted by the populus and its use becomes widespread.

Manpower is perhaps Colombia's biggest resource. Raising the standard of living is greatly a matter of increasing agricultural productivity, not only because it will result directly in a greater and more diversified output of food, fibre and export crops, but also, and perhaps even more important, because it will release labor for the production of other things. This double gain has been the underlying cause for the rise in living standards in all economically advanced countries, and it should form the basis for economic progress in Colombia. Various estimates indicate that between ninety and ninety-five per cent of all Colombians are either directly or indirectly related to agriculture. With this situation it becomes necessary, if progress is to be made by the Colombian farmer, to become more efficient in his production so that more manpower can be released for other industries.

Some rather serious limitations must be overcome, however, before the farmer in Colombia can produce as efficiently as the farmer of the U. S. A shortage of transportation and communication facilities effectively limits the marketing area, and necessitates crop production in the uplands where the bulk of the population live. Corn, yucca and sugarcane are grown on badly leached mountain soils with slopes ranging from 30 up to 80 per cent, while distant level lowland soils are not cultivated.

The mountainous slopes, of course, do not lend themselves to mechanization. In the intermountain valleys and plateaus where the topography permits the use of farm implements, the changeover from older more timeconsuming methods has not been complete. It is not unusual on the Savanna of Bogota, for instance, to see wheat being harvested by hand with a machine and by a self-propelled combine in adjacent fields. Complete mechanization has been slow, due in part to the relatively high initial cost, lack of operating know-how, difficulties involved in parts replacement and repair, and lack of equipment suitable to the specific crops and conditions.

Colombian industry is not producing sufficient quantities of the materials needed by agriculture. For instance, the chemical industry is primarily geared to producing pharmaceuticals. There are only three or four fertilizer manufacturing plants and no known local sources of pesticides or herbicides.

Considerable losses frequently occur in importation, which affect the availability and the low cost to the ultimate consumer. Lack of scientific investigation has limited the knowledge of the farmer as to the conditions existing on his farm and as to how best to proceed in providing a suitable environment for proper crop growth.

(*Turn to Page* 131)

# of The Pesticide Industry's $50 Million World Trade

WHILE it is sharply divided, the world has come to have a meaning of importance unequalled in this country's history. In the days of clipper ships, fortunes were made or lost in world trade, but now ideologies stand or fall on the ability of the free nations to exchange goods and services for mutual benefit. In the free world, not bars and bullets but standards of living and productivity are paramount. Means to those ends must concern us all.

In *Agricultural Chemicals* magazine the subject of World Trade will be better handled if tariffs and politics, those widely-discussed elements of trading, are first identified as "details." Important as they are to any transaction, there are other key factors in world trade in pesticide chemicals. That is no denial of our interest, merely a conclusion based on the demonstrated ability of the materials in which we trade to surmount amazing trade barriers—the need and value respecting no set pattern. Our industry warrants separate appraisal.

Pesticides are peculiar in world trade—having a phenomenal "reproductive value" in terms of goods, even though sometimes unpredictable. Where plant foods may generally yield ten times their value, pesticides may yield one hundred times their value, avert pestilence or famine, or possibly have no great effect at all. But even then, who can say that such insurance is valueless, when this country has grown to its present importance in world leadership, largely through improvement of its standard of living . . . one of the most useful tools we can offer the free world is to give the wealth-creating people and lands the insurance that we know to be effective against "plagues." Pesticides "called forward" by aid programs have put the whole industry in world trade, and our need is intelligently to plan a sound future.

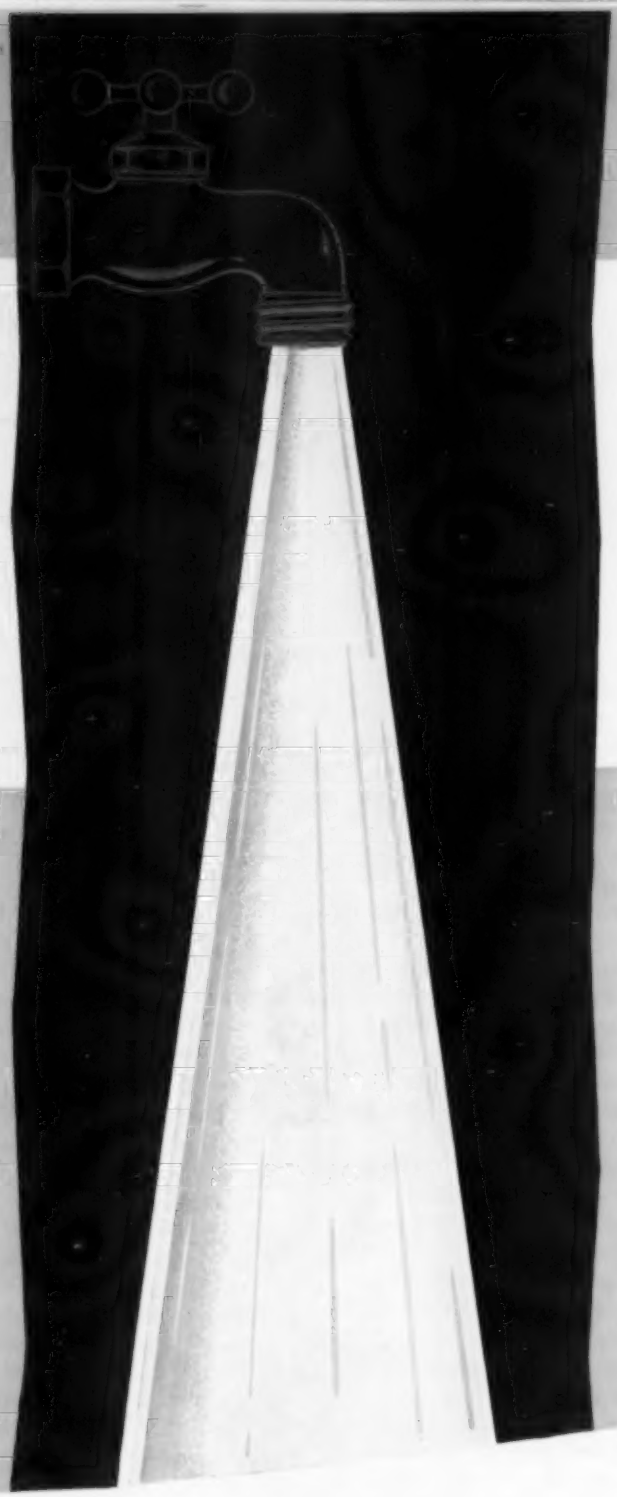
Our mushrooming industry is not new, but it has gone through a terrific expansion, a fantastic seller's market, and a period highly profitable to all concerned, producers and consumer alike. But those facts alone stand only as history—neither as experience nor as statistical basis are they adequate for projection to determine the future direction. We respect the fact that our experience antedates the twentieth century, our volume is five times that of the depression years, and world trade in pesticides has averaged a comfortable $50 million per year since 1950. We take comfort in the continued interest of major U. S. chemical producers in the world market, and the growing interest of all producers, large or small, affected as they are by the impact of the year-to-year and product-to-product fluctuations of world trade on the five-times-larger domestic program. And as the pesticide industry grows, so do the related agencies that help it, national and international. There is a great deal of promise in the future, for the potential market abroad is just about as large as the potential here at home—but there are important principles that our industry has yet to accept, rely upon, and benefit from.

A First Consideration

FIRST place, we often hear that we are not "internationalists," in spite of the fact that, money-wise and military-wise, we certainly are. And the products of our industry are proportionately internationalist, if not its people. The industry is scattered over a great country, and great land mass as compared with the British Commonwealth, or Europe. There is more domestic interest in the physical and personal sense than most nations enjoy. We say that world trade is of little interest because there is so little of it, but our industry's $50 million world trade volume exceeds that of most nations by a large margin. Actually, in serving our markets, we are shipping goods and traveling men just as far as any nation, per dollar of sales volume, but because they seldom face oceans or political boundaries it seems less. If they did, we would all be internationalists. Because we rarely see a foreign customer, we are often impressed by his similarity with any other customer just outside our normal trading area—if he speaks English. And one of the nicest things about selling abroad is finding a cus-

(*Continued on Page 123*)

*By J. Merritt**
Virginia-Carolina Chem. Corp.
Richmond, Va.
*Chairman of the Foreign trade committee of the NAC



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Prominent Agriculturalists on N.A.C. St. Louis Program

PROMINENT figures in the agricultural chemicals industry will be featured speakers at the annual spring meeting of the National Agricultural Chemicals Association to be held at the Hotel Chase, St. Louis, Mo., March 7-9. This year's program is directed to "Better farming with agricultural chemicals." L. S. Hitchner, executive secretary of NACA, emphasizes the fact that "Agricultural chemicals are the farmer's best means today of cutting his production costs . . . and thereby of making more money."

Another feature of the three-day meeting will highlight the growing importance of soil insecticides. George W. Decker, University of Illinois; John H. Lilly, Iowa State College; C. C. Compton, Shell Chemical Co.; and O. N. Allen, University of Wisconsin, will participate in a panel discussing this field.

Another panel reviewing developments in herbicides will include comments from A. E. Carlson, E. I. du Pont de Nemours & Co.; R. D. Sweet, Cornell University; M. W. Parker, USDA; L. Sherwood, Monsanto Chemical Co.; H. L. Smith, Dow Chemical Co.; and J. Dreesen (NAC). Latest reports on legislation and an analysis of the Miller Law will be presented by J. A. Noone, NAC; W. G. Reed, USDA; John D. Conner, NAC counsel; and W. B. Rankin, U.S. Food and Drug Administration. Lea Hitchner will be moderator at this discussion.

W. W. Allen, president of the association and vice president of Dow Chemical Co., will open the meeting with a discussion of "Farm Chemicals . . . A Realistic Outlook." He will introduce F. Heinkel, midwestern farm representative, who will present a "grass roots" version of agricultural chemicals' use.

Featured speaker at a luncheon-banquet to be held Tuesday, March 8th, will be the Hon. True D. Morse, Under-Secretary of Agriculture, reviewing "Agriculture That Is . . . Stable, Prosperous, and Free."

Monday, March 7

"Farm Chemicals . . . A Realistic Outlook"
W. W. Allen, Dow Chemical Co.

"Farm Chemicals . . . The Farmer's Viewpoint"
F. Heinkel, Missouri Farmers Assoc., Inc.

"Grain Storage . . . The Farmer's and Country Elevator's Problem"
Donald A. Wilbur.

"Disorder of Chaos"
John L. Gillis, Monsanto Chemical Co.

Tuesday, March 8

"Farm Chemicals . . . Legislation, Help and Hindrance"
Lea S. Hitchner, NAC secretary.

The Future of Herbicides . . . A panel discussion.
Moderator, Jack Dreesen, NAC
Participants: L.V. Sherwood, Monsanto Chemical Co.; H. L. Smith, Dow Chemical Co.; A. E. Carlson, E. I. duPont de Nemours Co.; M. W. Parker, USDA; and R. D. Sweet, Cornell University.

The Future of Soil Insecticides . . . A panel discussion
Moderator, George W. Decker, University of Illinois.
Participants: J.H. Lilly, Iowa State College; C. C. Compton, Shell Chemical Corp. and O. N. Allen, University of Wisconsin.

Luncheon Banquet

Guest Speaker, Hon. True D. Morse, Under Secretary of Agriculture.

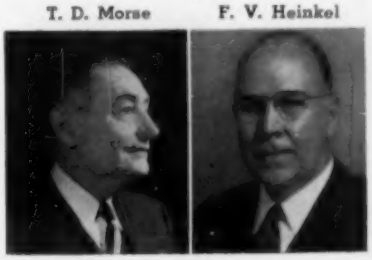
"Agriculture that is . . . Stable, Prosperous, and Free"

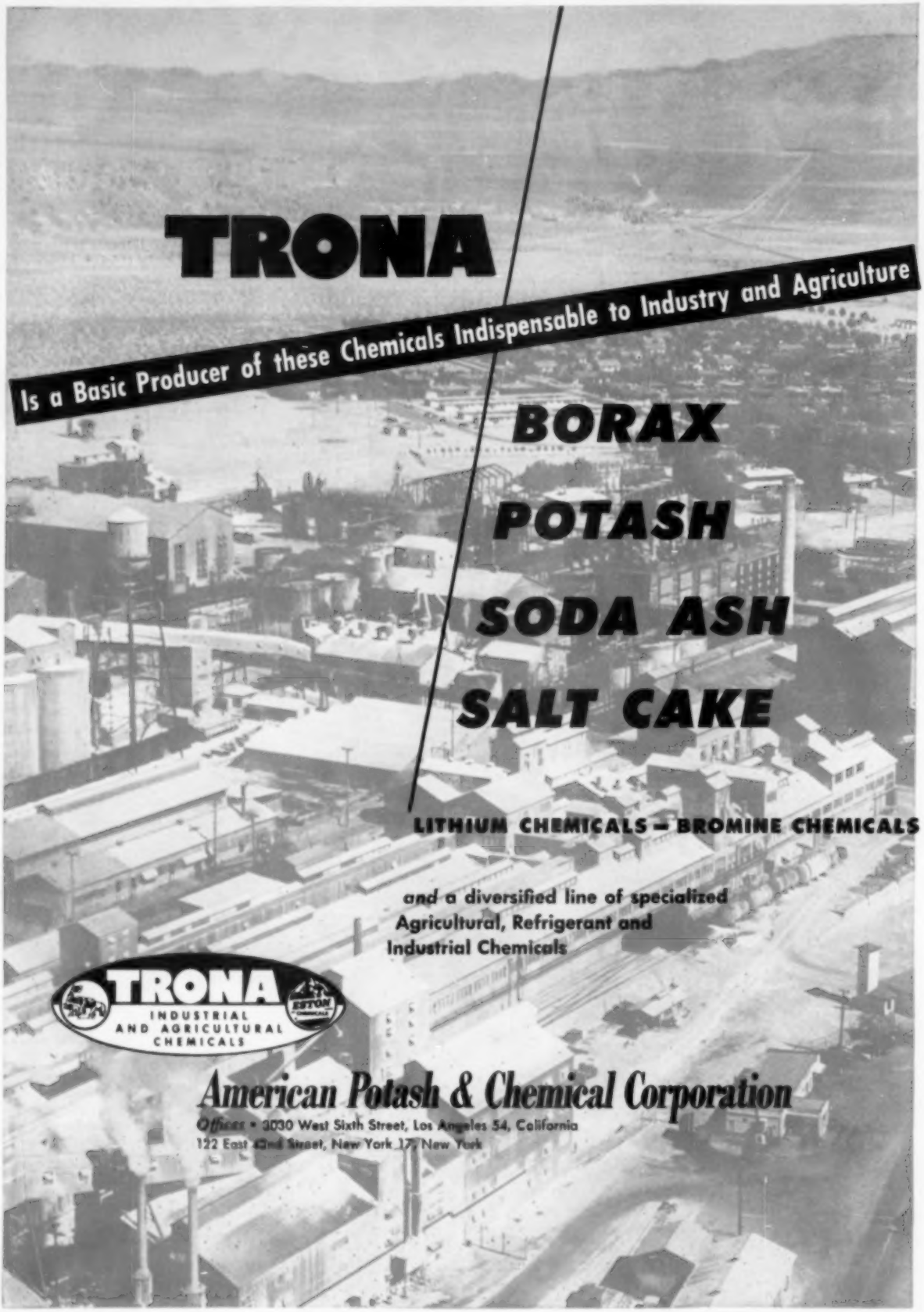
Wednesday, March 9

"What Must You Do to Operate Effectively after July 22, 1955"
Lea S. Hitchner, W. B. Rankin, Food and Drug Administration; A. G. Reed, USDA; John D. Conner, NAC Counsel; and J. A. Noone, NAC.

Photo USDA

T. D. Morse **F. V. Heinkel**

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Northwest Agricultural Conference

By Charles Starker

THE second annual Pacific Northwest Agricultural Chemical Industry Conference was held at the Benson Hotel, Portland, Oregon, January 19, 20, 21, 1955. This meeting, which was sponsored by the Western Agricultural Chemicals Assn., brought together some 100 industry sales and research personnel from the Pacific Coast, as well as other sections of the country. Mr. O. B. Hitchcock, Chemagro Corp., San Mateo, Calif., conference chairman, introduced the various speakers during the conference.

Herbicides in Washington State

"THE problems of brush control in western Washington offer a greater potential for herbicide sales than the general selective work in other areas of the state," Auburn Norris, weed supervisor, Washington State Department of Agriculture, stated. "Brush is still the number one problem," he continued, "with plenty of room for development." 2,4-D drift damage has not been great in western Washington, although a few minor incidents have been reported. As a result, it has not been necessary for them to set up any control areas. In eastern Washington the situation is slightly different. Here 2,4-D drift has injured peaches, ornamental trees and shrubs, and grapes, so that herbicide control areas have had to be established.

In 1954 air applicators flew high volatile esters on 240,000 acres; low volatile esters on 200,000 acres and amine 2,4-D on 25,000 acres of wheat in Washington. Ground sprayers put on an amount only slightly less than this. Norris indicated that due to adverse weather, only about half the potential acreage was sprayed last year.

"The Miller Amendment provides that for purposes of the Food and Drug Administration, a raw agricultural commodity is adulterated if it bears or contains the residues of a pesticide, unless: 1) the amount of residue is within the limits of a toler-

Top Left: E. Pullen, Van Waters and Rogers Co., Portland; L. W. Hanna, General Food Corp., Hillsboro, Ore.; C. C. Papke, Amer. Cyanamid Co., Oakland.

Top Right: Ed Littooy, Colloidal Prod. Corp., San Francisco; Louis Gentner, Oregon Station, Medford; L. Harman, Geigy Co., Walla Walla, Wash.

Center Left: Otto Steinen, Naugatuck Chem. Div., Los Angeles; C. O. Persing, Stauffer Chem. Co., Mt. View, Calif.

Middle: Ed Turner, Calif. Spray Chem. Co., O. B. Hitchcock, Chemagro Corp., San Mateo, Calif.

Right: R. D. Eichmann, Stauffer Chem. Co., Portland, D. G. Denning, Velsicol Corp.

Bottom Left: Dr. T. A. Merrill, WSC, Pullman, Wash.; Dr. Wm. M. Upholt, USPHS, Wenatchee, Frank Kirkpatrick, Amer. Cyanamid Co., Oakland.

Bottom Right: C. O. Barnard, Western Agri. Chem. Assn., San Jose, A. L. Norris, Washington Dept. Agr., Yakima; V. H. Freed, OSC, Corvallis, Ore.

ance established by regulation, or 2) the residue has been specifically exempted from this necessity of a tolerance by regulation, reported D. W. Dean, USDA, Pesticide Regulation Section, San Francisco, in a discussion of the Miller Pesticides Law.

Antibiotics in Agriculture

"ANTIBIOTICS are effective and safe weapons for use against fungi and bacteria," Robert C. Ottke, Chas Pfizer Co., Brooklyn, N.Y., told the conference. "As their action is systemic in nature, they can readily attack that portion of the plant being invaded by fungi or bacteria, and with this type of activity, there is little danger of rain washing them out of established infections. Antibiotics may also be applied as protective materials and not as eradicants.

Of the antibiotics tested to date, streptomycin, and a combination of streptomycin and terramycin have shown the most promise. Various methods of application have been attempted, but sprays have given the best results to date. Dust applications were quite disappointing, he reported, as were soil applications.

Effects of Pesticides

"TODAY'S researchers have very meager information on the effects of pesticides on humans," stated J. H. Pepper, Montana State College entomologist. "Too much emphasis is being placed," he continued, "on cholinesterease levels, and not enough on other body manifestations." He indicated that research groups might learn more if they followed along some of the same lines used by cancer research, where investigators have attempted to learn *why* certain materials have not worked.

Pest Control in British Columbia

"SINCE the development of the concentrate sprayer in 1949, use of this type of equipment in British Columbia has become so popular, that today nearly 90% of orchardists in the Okanogan area use them," stated Dr. James Marshall, of the Dominion Entomological Laboratory, Summerland, B.C., in a report on pest control in British Columbia. He advised that use of surfactants in concentrate sprayers has aided Columbian orchardists in securing more uniform deposits on lower parts of trees, . . . and that where DDT is used with surfactants, control is better than with DDT alone. Results with surfactants on scab control are even more outstanding, said Dr. Marshall. Infection is reduced from 14% to 4%. He cautioned, however, that where a chemical has a tendency to cause plant injury, its use with surfactants will tend to increase the injury.

Use of spray additives in weed control opens up a special field of use, stated Ed Littooy, Colloidal Products Corp., San Francisco, in an address on spray adjuvants and modifiers. Proper use of surfactants may increase penetration of other substances into plant cells, he said, and adjuvants have a special place in air application of herbicides — giving a more uniform droplet size, and resulting in better coverage and penetration, with less drift hazard from ultra small droplets. It is of course essential, reminded Mr. Littooy, that the proper adjuvant be selected for a specific job.

A panel discussion on "Agricultural Chemical Registration and Toxicity," included as members: P. O. Ritcher, Oregon State College; J. D. Patterson, Oregon Department of Agriculture; R. W. Every, Oregon State College, and Sullivan, Oregon State Board of Health.

"The major difference between the Oregon and Federal laws relative to pesticidal chemicals is that Oregon has no option on labeling the percentages of active and inactive ingredients," Mr. Patterson stated. In his opinion, certain products should be accepted in Oregon for limited registration only. This type of "limited registration" should apply to those materials which have a definite place in agriculture, but which should not be used by the inexperienced, or by those unable or unlikely to take necessary protective measures recommended on the labels of these materials.

Dr. Sullivan stated that deaths occurred in Oregon this past season from both toxaphene and TEPP, with other cases near death. All of these situations, he feels, came from possible mis-use of these pesticides and lack of label comprehension on the part of the user.

R. W. Every emphasized the cooperation received from basic manufacturers and blenders to college researchers and extension people and to county agents. He called attention to their use of bulletins to keep the public posted on current developments in the pesticide field and mentioned his concern regarding possible unrealistic legislation on pesticides which could make enforcement and use unwieldy.

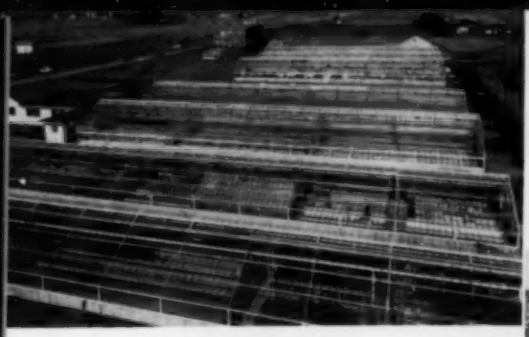
In answer to a question from the floor relative to print size on labels, Delvan Dean, USDA field representative, stated the size should be adequate for a person with 20/20 vision to see readily. In response to the question "What is a 'safe' pesticide?" Dean told the group that the cautions and warnings required by the USDA are divided into several groups of toxicity, with frequent reclassification if indicated—such reclassification based on actual field experience. Thus with carbon tetrachloride, they are now strengthening their label requirements. In poisoning cases investigated by the USDA many of the users did not read the label.

State and Industry Relations

"CONSUMERS should always use the most effective chemical for a specific problem. Frequently insecticide salesmen will be tempted to 'oversell' a product for the sake of sales. Although a product label may state a given material is effective for control of a specific pest, it may not be *the* most effective one which could be used," Dr. H. C. Manis, University of Idaho stated. He objects to the practice of recommending new materials for commercial field use before full field experience is gained with them.

"Recommendations need to be translated in terms of area and local differences. Species identification is most important, especially with mites.

(*Turn to Page 125*)



Extensive experimental greenhouses and a wide expanse of farmland characterize the University Farms of the Pennsylvania Agricultural Experiment Station.

Low concentration DDT sprays for cabbage caterpillar control at Pennsylvania Agricultural Experiment Station. Row at left unsprayed.

Experimental brush spraying on Penelec lines.

Centennial

Pennsylvania Agricultural Experiment Station

By M. O. Farrell

THE Pennsylvania State University is celebrating its Centennial year this 1955. Experimental work in agriculture under the direction of William G. Waring, supplemented by the laboratory studies of Dr. Pugh, began in 1857, two years after the charter of the Farmers High School (which later became Penn State) was signed.

Systematic and productive experimental work on agricultural research was begun in 1881 when Dr. William H. Jordan, professor of agriculture and agricultural chemistry, established what now are known as the Jordan Soil Fertility Plots.

Now overshadowed by huge academic buildings, The Jordan Plots have collected data over the past 2 years showing conclusively that good soil may be sadly worn but is hard to destroy. Application of lime and fertilizer in quantities shown to be needed by soil tests, even to plots which have received none since 1881, has brought about gratifying response in plant growth. Worn-out soil, well drained and having depth and water-holding capacity, may be restored to production immediately by treatment with amendments and commercial fertilizers.

The future role of lime and fertilizer in Pennsylvania is indeed huge when one considers the millions of acres of uncultivated but potentially-usable pasture land. Experiments by J. B. Washko, R. P. Pennington, and others are showing how many of these acres may be put to use any time that their employment becomes an economic need. Basic studies by C. D. Jeffries have revealed possibilities of filling potash requirements of soils.

In addition, the place of cover crops, crop rotations, fertilizers, and soil conditioners in vegetable and fruit growing have been pretty well outlined by R. B. Alderfer.

Basic studies of foliar diagnoses conducted for many years by Walter Thomas and at present by C. B. Smith have contributed greatly to knowledge of the proper balance of N, P, and K which must be maintained in soils for the best nutrition of plants.

Stemming from work in preservation of human food done during World War II by R. L. Cowan, he and J. W. Bratzler have developed the use of sodium metabisulfite in preserving grass silage into a process which has increased in commercial importance. Use of bisulfite eliminates objectionable odors, besides providing a product of evident palatability to cattle.

Soft phosphate with collodial clay is finding a place in swine feeds as a result of discoveries by J. L. Gobble and R. C. Miller. Dr. Miller also was a leader in the discovery of the cause of X-disease of cattle, a malady resulting from feeds contaminated by highly chlorinated naphthalenes.

Not long ago, applications of certain plant hormones were found by M. L. Odland to stimulate early fruiting of tomatoes. Similarly, starter solutions have been found to encourage early growth of newly set plants. Such items are of great interest to growers who are producing tomatoes for an early market. Adoption of the use of concentrated miticide and insecticide sprays has been furthered greatly with consequent benefits to fruit growers and consumers by research conducted by Dean Asquith and J. A. Cox. Asquith's economic appraisal of the concentrate sprayer furthered its use greatly in the whole Cumberland-Shenandoah fruit region.

L. E. Dills lately has shown real benefits from the use of DDT, aldrin, dieldrin, and others of the newer

(*Turn to Page* 129)

LISTENING *Post*

Yellow Clover Aphid Active in SW; Grasshopper Survey

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

THE yellow clover aphid, *Myzocallis trifolii* (also called *Therioaphis ononidis*), which early in 1954 was first reported as being a serious pest of alfalfa, has remained active throughout the winter in the Southwest. Since the first report, which was from New Mexico, the aphid has appeared in and caused damage in Arizona, California, Nevada and Texas. The pest which last summer caused rather widespread damage in sections of Arizona in January was still responsible for considerable damage to alfalfa in the Yuma area. This damage was particularly noticeable in new plantings and re-seeded fields. Three nights of below freezing temperatures caused no noticeable decrease in the aphid population. In Graham county severe damage occurred during the early winter period; whereas in the summer, although a few aphids were noted, no damage was apparent. The aphid was collected in California, first from burclover, February 7, 1954, at San Diego. Since that date serious infestations have occurred on alfalfa in San Diego, Imperial and Riverside counties. Light infestations were recorded from San Bernardino county in November and Los Angeles county in December. A single specimen was taken at Edison, Kern county, January 25, 1955, making the first time the aphid had been taken north of Tehachapi Mountains. This find was 60 miles north of the nearest previous location. The aphid has now been reported from Texas as damaging alfalfa. Positive identification has been made of specimens collected in Burleson county. Damage from aphids suspected of being this species has also been reported from the panhandle area, and Maverick county.

The yellow clover aphid is a whitish-yellow species about one-half the size of the pea aphid. It differs from the pea aphid in its feeding habits on alfalfa in that it forms colonies on the leaves, usually on the underside of the older leaves, while pea aphid colonies are found mostly on the terminal portions of the stems. Damage consists of defoliation of the lower part of the plant and heavy production of honeydew, which often supports the growth of sooty molds. Fields heavily infested may appear green before cutting, but immediately after may be picked out by the blackened condition of the crowns. Alfalfa from infested fields is of inferior quality, and where much honeydew is present, is impossible to dehydrate and difficult to cut and bale.

Estimates of losses made before the end of the growing season give an idea as to the damage the insect can inflict. In New Mexico, losses were estimated at $4,000,000; Arizona losses, not counting decreased vigor and loss in seed production, were estimated at $500,000; and California losses were estimated at $337,900. Although no dollar damage was given by Nevada, many alfalfa fields in Clark county were severely damaged, especially those planted in the spring of 1954. Reduction of some stands amounted to more than 80 per cent.

Control of the yellow clover aphid by insecticides is evidently easy, but reinfestation appears to be rather rapid. Although natural enemies were present in many fields, they failed to cope with the problem. Control recommendations should be obtained from State and Federal agencies who can supply information on approved insecticides and rates of aplication. It is thought, however, that the following notes from the states confronted with the problem in 1954 might be interesting. In New Mexico the following insecticides were tried: DDT, malathion, parathion, BHC, Systox, nicotine, TEPP and sulfur, alone or in combination with other insecticides. All of these gave excellent clean-up except DDT which was slow and erratic. Recommended materials in Arizona were: malathion , parathion, DDT, toxaphene and sulfur dust; and DDT and toxaphene spray. In California parathion gave excellent results while very good results were reported from the use of malathion in Nevada.

Grasshopper Survey Results

THE Grasshopper Control Project and cooperating state agencies conducted surveys during the fall of 1954 on grasshopper, Mormon crickets and chinch bugs. Data obtained on these surveys have been compiled and the 1955 outlook for these pests released. Grasshopper infestations increased in cropland areas in many of the Mid-western states. The surveys showed that the greatest increase in grasshopper populations took place in northern Indiana, southern Wisconsin, southern Iowa, the eastern portions of Nebraska and Kansas, Minnesota, Missouri, and Oklahoma as

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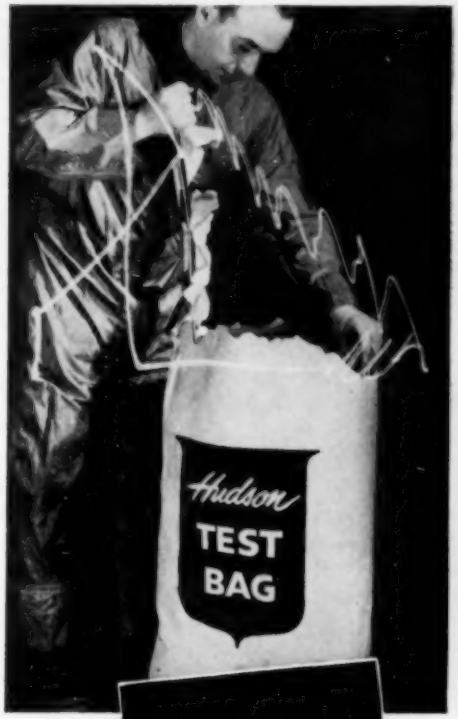

Photo left: Actual light tracing photo shows how knife blade or pull and tug method of opening wastes time and product.

Photo right: Snap motion opening – saves time and product.

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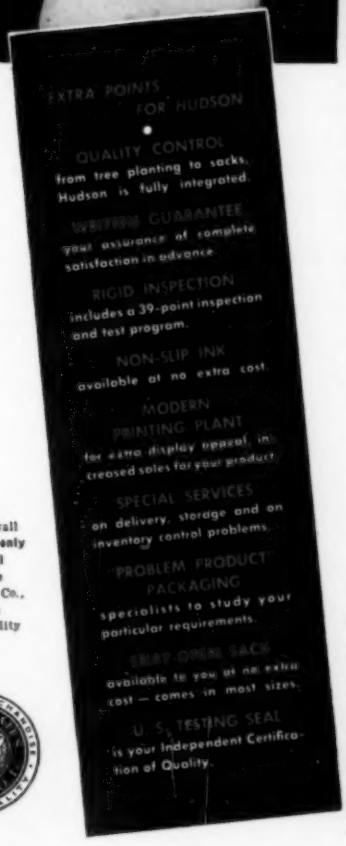

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well as parts of South Dakota, Texas, and Utah. Preliminary estimates indicate that in 1955 some 6,000,000 acres of rangeland may require control in Arizona, California, Colorado, Kansas, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, Oklahoma, Texas, Utah, Washington and Wyoming.

The chinch bug problem in 1955 is not expected to differ greatly from that of 1954 when damage resulted to corn and sorghum in many local areas. Surveys made in the fall of 1954, after adults went into hibernation, show ratings of scattered, locally severe or very severe in northeastern Arkansas, east central Illinois, east central Kansas, northern Missouri and northeastern Oklahoma. Elsewhere in the states surveyed ratings ranged from non-economic to threatening.

Mormon cricket infestations spread little, and the need for control should be less than in 1954. The greatest increase in infestations occurred in Montana. Small areas in Colorado, Idaho, Nevada, Utah, and Wyoming will warrant control attention, however, the total area to be baited probably will not exceed 83,200 acres.★★

Preharvest Fungicidal Spray Studies on Fruits, Trees

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

JOSEPH M. Ogawa, Ross Sanborn, Harley English, and E. E. Wilson, of the University of California, write that in 1954, brown rot, caused by *Moilinia fructicola*, reduced the peach crop in the central California peach districts. This is the third consecutive year in which severe losses have been incurred. In each of these years, a short rain gave impetus to the disease in peach varieties that were nearly ripe or ripe at that time. In a previous epidemic, in 1948, however, exceptionally heavy dews at night probably contributed to the severity of infection.

Taking into account this relation of moisture to infection, the experiments included both pre-infection and post-infection treatments of the fruits with various fungicides.

Trees grown under commercial orchard conditions in Butte and Sutter Counties were used. Each spray treatment was given to 10 to 15 fully mature trees. The varieties used, in the order in which they were tested and in the order of their maturity, were Fortuna, Peak, and Sims. During 1954, sprays were applied 3 to 4 weeks and 1 week before harvest maturity, unless indicated otherwise. To increase disease development, the trees were sprayed with water during 3 to 6 days after the second spray application. Data as to the percentage of diseased fruits were taken in the orchard 5 to 6 days after the simulated rain.

The trade and common or chemical names of the spray materials used were as follows: Orthocide 50W (captan), Zerlate (ziram), Mathieson Bulb Fungicide No. 275 (pentachloronitrobenzene), Flotex Wettable Sulfur (wettable sulfur), Purex (sodium hypochlorite), Phygon XL (dichlone), Manzate (maneb), Vancide 51ZW (zinc dimethyl dithiocarbamate; zinc 2-mercaptobenzothiazole), lime-sulfur (calcium polysulfide), Dowicide A (M-244) (purified sodium orthophenylphenate), Isothan Q15 (lauryl isoquinolinium bromide), Polysulfide Compound (sodium polysulfide), XSF#3 (H. L. Woudhuyhen and Associates, experimental silver fungicide), Tag 331 (phenyl mercuric acetate), and Puratized Apple Spray (phenylmercuric monoethanol ammonium acetate).

Protective Measures:

EXPERIMENTAL data for 1953, summarized in Table 1, show that Orthocide 50W consistently afforded good protection in three separate trials. Zerlate and Mathieson Bulb Fungicide No. 275 also appeared promising. Two applications of either Orthocide 50W or Purex appeared to

TABLE 1.

The use of preharvest fungicidal sprays for the control of brown rot in peaches in central California. 1953 experiments.

Chemical	Material per 100 gals. spray	No. of sprays	Average percent diseased fruits		
			Stuart[b]	Walton[c]	Johnson[c]
Orthocide 50W	2.0 lbs.	1	28.2	50.3	16.7
Orthocide 50W	2.0 lbs.	2	—	12.7	12.7
Zerlate	2.0 lbs.[d]	1	39.2	—	—
Mathieson Bulb Fungicide No. 275	6.0 lbs.	1	52.7	—	—
Flotex Wettable Sulfur	6.0 lbs.	1	54.7	67.0	—
Purex	1 gal.	1	61.0	91.7	87.3
Purex	1 gal.	2	—	63.0	33.7
Check	—	—	81.2	96.0	91.7
L. S. D. 5%			24.7	44.3	22.7
L. S. D. 1%			33.3	63.1	33.1

[a] (1) 6 days before harvest. (2) 6 and 11 days before harvest.
[b] Fruits dusted with spores and kept wet for 7½ hours during the night to induce disease.
[c] Fruits not dusted with spores. Fruits picked at random from plots and incubated in a moist chamber to determine the effectiveness of control.
[d] Plus 2 oz. duPont Spreader-Sticker.

TABLE 2.

The use of preharvest fungicidal sprays for the control of brown rot in peaches in central California. 1954 experiments.

Chemical	Material per 100 gals. spray	Fortuna		Peak	
		Diseased fruits %	Spray injury[c]	Diseased fruits %	Spray injury
Flotex Wettable Sulfur	10 lbs.	4.6	0	3.9	0
Phygon XL	¾ lb.	3.9	***	—	—
Phygon XL	½ lb.	—	—	4.4	†
Orthocide 50W	2 lbs.	3.1	0	4.6	*
Manzate	2 lbs.[a]	3.0	0	4.0	**
Zerlate	2 lbs.[a]	6.6	0	—	—
Vancide 51ZW	2 lbs.[b]	9.5	0	—	—
Mathieson Bulb Fungicide No. 275	6 lbs.	8.2	0	—	—
Purex	1 gal.	6.3	0	—	—
Check	—	11.6	0	17.6	0
L. S. D. 5%		2.5		4.4	
L. S. D. 1%		3.6		6.1	

[a] Plus 1 oz. duPont Spreader-Sticker.
[b] Plus 1 oz. Triton X-100
[c] 0 None.
* Slight, only skin deep.
** Moderate, only skin deep.
† Severe, into flesh.

be more effective than one.

In a preliminary trial during 1954, eight spray materials were applied on Fortuna peach trees. In an additional test, four of the most promising materials were applied to the Peak variety. The results of both trials are given in Table 2.

On Fortuna, all treatments were significantly better than the check at the 1% level, except Mathieson Bulb Fungicide No. 275, which was significantly better than the check at the 5% level, and Vancide 51ZW which was not significantly better than the check. There were no significant differences in the results obtained with Orthocide 50W, Phygon XL, Flotex Wettable sulfur, and Manzate. Orthocide 50W and Manzate were significantly better than Zerlate at the 5% level and better than Vancide 51ZW and Mathieson Bulb Fungicide No. 275 at the 1% level. In the trials on Peak with the four most promising compounds, all of the treatments reduced the percentage of diseased fruits significantly (1% level), as compared with the check. Similar results were obtained with all of the materials.

Phygon XL at ¾ and ½ lb. per 100 gallons of spray produced injury to the fruits which extended into the flesh. Careful observations were made to determine the extent of the injury in two orchards where the material was applied with a speed sprayer. The fruit surfaces facing the sprayer and fruits located closest to the spray nozzle suffered injury (distinct lesions), whereas least damage occurred to peaches high in the tree. Fruits in one orchard were more severely injured than those in the other, even though the spray treatments were said to be the same. These facts appear to indicate a correlation between spray coverage and injury. Phygon XL might serve as a good material to determine spray coverage on peach fruits.

Trees of the Sims variety were sprayed with spores of the brown rot fungus, and then sprayed with water in an attempt to obtain a high incidence of disease. In addition to artificial moisture, the trees were wetted by rain. The data in Table 3 show that all treatments were significantly better than the check at the

(*Continued on Page 119*)

Data for Table 4:
[a] The trees were sprayed with a spore suspension, and moisture was maintained on the fruits for 18 hours before eradicants were applied.
[b] 0 None
* Very slight
** Slight
† Moderate

TABLE 3.

The use of preharvest fungicidal sprays for the control of brown rot in Sims variety of peach, 1954.

Chemical	lbs. per 100 gals. spray	Percent diseased fruits	
		Two sprays	One spray[b]
Orthocide 50W	2	13.7	5.5
Manzate[a]	2	16.4	10.6
Flotex Wettable Sulfur	10	19.1	14.9
Zerlate[a]	2	21.5	—
Check	—	43.6	39.8
L. S. D. 5%		9.7	11.2
L. S. D. 1%		13.3	15.5

[a] Two oz. of duPont Spreader-Sticker added per 100 gallons of water.
[b] Applied 1 week before the addition of moisture.

TABLE 4.

The effectiveness of fungicides applied as eradicants for the control of brown rot in Peak peaches, Butte County, California 1954[a].

Chemical	Amount per 100 gals. spray	Percent diseased fruits	Spray injury
Lime-sulfur	2 gals.	16.2	**[b]
Lime-sulfur	0.5 gal.	27.0	*
Purex	4 gals.	26.7	0
Manzate	4 lbs.[c]	35.2	†
Dowicide A (M-244)	4 pts.	35.4	*
Orthocide 50W	4 lbs.	38.7	*
Isothan	2 pts.	32.6	*
Check	—	52.6	0
L. S. D. 5%		17.7	
L. S. D. 1%		23.8	

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MA 4-18

CLIMAX MOLYBDENUM

WASHINGTON *Report*

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

HEADLINE speaker at the NAC meeting in St. Louis will undoubtedly voice the importance of farm management in his address. True D. Morse, Under-Secretary-of-Agriculture, is a businessman's consultant, having been in charge of one of the leading farm management services in the world, the Doane Agricultural Service.

In previous talks before business groups, Morse has called for farmer-businessman team work as a combination which will solve agricultural problems most rapidly, bring farmers more security and prosperity, and develop new markets for businessmen. He believes that business, in general, will profit from increasing farm prosperity. The challenge to businessmen, in his opinion, is to do an increasingly better job of serving farmers. "Farmers and businessmen teamed up together will forge ahead to many achievements," the Under Secretary said during a recent farmer-businessman meeting in Iowa.

Certainly the Under Secretary is well-qualified to address the pesticide industry, which is right now seeking ways of better serving the farmer, by demonstrating how the use of modern chemicals can cut farm production costs.

A 3-star-extra banner for industry could be made up from this fundamental thought—sell the farmer lower cost production—not higher yields. With the nation's granaries bulging, and farmers forced to fall back on acreage allotments and other restrictive measures, boosting production by itself doesn't have much appeal. Showing the farmer how to cut the cost of production and make more money is certainly something that he'll listen to six days a week. This is the general thinking behind Mr. Morse's policy in the USDA. It's the philosophy he's selling. Therefore, it seems most timely for him to speak to the leaders of the nation's pesticide industry.

July 22nd is the target date after which Food and Drug can seize crops in interstate commerce exceeding legal limits of established pesticide tolerances or those crops bearing residues for which no tolerance has been established.

Food and Drug emphasizes that the farmers' protection against seizure is the label information on the pesticide container. Consequently, it appears that no manufacturer will want to sell a pesticide which has not been processed through the Food and Drug—USDA mill. Apparently crops planted before July 22nd, but harvested on or after that date are liable for seizure. Consequently, it would seem advisable to have labels approved as quickly as possible.

* * *

James Merritt, chairman, NAC Foreign Trade Committee, outlined the long-range interest of the pesticide industry in the work carried on by agricultural attaches of the USDA during a meeting of the Committee in Washington.

P. K. Norris, director Foreign Service Division, one of the original agricultural attaches appointed in 1930, addressed the meeting. There are over forty offices located in U. S. embassies throughout the world where these attaches serve as the eyes and ears of the U. S. farmer. The agricultural chemicals industry may find statistics and other data in foreign countries helpful. However, Norris emphasized that the attaches are not held responsible for promoting the sale of products manufactured by U. S. industry. Rather, they are to serve the farmer.

Since pesticides are high value per pound products, Mr. Merritt observes that they enjoy a market potential which is world-wide, and that consequently the industry is interested in continuing to develop avenues of trade for distribution of the industry's scientific advances.

The advantages of pesticides to world health were also reviewed during the committee meeting. It is believed in some quarters that this field offers an immediate potential for more trade.

* * *

PROFIT-HUNTING companies might make a strike by gearing a "sales pitch" for irrigation farmers. Irrigation opens up a whole new world, a "Garden of Eden" kind of farming, where everything is lush and green and income zooms. The "green farm" can be a big market for pesticides. Reason is that the tremendous cost of irrigation, ranging from $100 to $300 or $400 per acre, requires big yields to succeed.

The speed with which irrigation is growing is rather amazing. In Missouri, for instance, about 2,000 acres were irrigated in 1949. By 1953, the figure had increased to over 11,000 acres. In Virginia, 2,800 acres were irrigated in 1949. In 1953, over 12,000 acres were under irrigation.

Figuring the cost of an irrigation system on the low side—that is $100 per acre—this phenomenal growth means that Virginia farmers have invested at least $1,300,000 in irrigation equipment.

(*Continued on Page* 121)

Technical SECTION

Weed Control Studies in Cotton Using "Karmex DL"

TEST work in 11 states in 1953 confirmed previous experimental evidence that "Karmex" DL herbicide would give good control of weeds in cotton, according to reports by E. I. du Pont researchers.

Cotton acreage treated with "Karmex" DL herbicide totalled over 9,000 acres in 1954. About 75 per cent of this acreage is in the mid-south in an area where spray equipment is commonly available. Material was used on a commercial basis in the piedmont areas of the Carolinas, Georgia, and Alabama, and in the delta areas of Mississippi, Arkansas, and Louisiana.

Growers had some difficulty evaluating pre-emergence weed control in 1954 because freezing temperatures required replanting two or three times the normal amount of acreage. This distributed the treated soil, reducing effectiveness of pre-emergence weed control. Growers reported generally good control of the seedlings of such weeds as crabgrass, pigweed, purslane, cocklebur, lambsquarters, and water grass, at appreciable savings over hand-hoeing. Control lasted from three to eight weeks. Plantation operators report hoeing costs range from $5 to $40 per acre per season. With "Karmex" DL herbicide, at least one hoeing, and in some cases as many as four hoeings, were eliminated.

Soil type seemed to be critical in determining the margin of safety when using "Karmex" DL. On clay soils and soils high in organic matter, doses of three pints per treated acre generally provide good weed control with no injury to the crop. On light sandy soils a dosage of approximately two pints per acre has given comparable results.

"Karmex" DL is applied as a spray to the soil surface before seedlings of either cotton or weeds have emerged. It is carried by rainfall into the upper ½ to ¼ zone of soil where most weed seeds germinate.

The manufacturer reports that "Karmex " DL herbicide will be available for commercial use on cotton this year in North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Arkansas, Tennessee, the Red River Valley area of Texas and Oklahoma, and southeastern Missouri. Test work in other cotton states will be continued in 1955. Pre-Emergence Weed Control in Cotton, *E. I. Du Pont De Nemours & Co.*, Jan. 1955.

Left: Untreated check, four weeks after planting.

Right: Treated with "Karmex" DL at planting time. Photo taken about four weeks after planting.

Karathane Controls Mildew

Smokes of Karathane are reported to be an effective method for controlling powdery mildew in greenhouses, reports C. D. McKeen, plant pathologist with the Canadian Department of Agriculture. Application of the new fungicide by the use of smoke constitutes a "notable advance in the field of chemical control," McKeen writes in the December 15 issue of the U. S. Department of Agriculture's *Plant Disease Reporter*.

McKeen's report covers a number of tests and a year of commercial experience in controlling the mildew on greenhouse cucumbers in southern Ontario. Karathane was introduced in the U. S. and Canada last spring and is now used in many areas for control of powdery mildew on field crops. It is the first successful organic fungicide to be developed for this purpose, and it is usually applied as a spray or a dust. The smokes are prepared by burning specially prepared commercial preparations containing Karathane.

Dust and sprays of Karathane were found to be superior to sulfur or copper sulfate for mildew control in the Ontario studies, but not nearly as effective as smoke applications. Another advantage of smoke applications is the small amount of labor involved, McKeen reports.

McKeen also found sprays to be superior to both copper sulfate and sulfur in controlling mildew. Karathane dusts likewise "afforded excellent control of mildew on greenhouse cucumbers for a period of six weeks to two months." However, he adds, "as a smoke, a form in which it is most easily applied, Karathane is outstandingly effective.

Karathane is reported also to give effective control of red spiders and various other types of mites when applied as a dust or spray. It is known chemically as dinitro (1-methyl-heptyl) phenyl crotonate. It is being used in dusts and sprays in the United States for control of powdery mildew and mites on apples, cantaloupe, cucumber, squash, and watermelon, as well as on roses and many other flowers and ornamentals.

New Seed Protectant

"Delsan" AD seed protectant containing "Arasan" seed disinfectant and dieldrin insecticide is recommended for treatment of beans (including limas), seed corn (field and sweet), and pea seed.

Effectiveness of dieldrin-thiram combination in improving stands has been established by field trials on corn and beans in Wis., N. Y. and Pa.; beans and peas in Mich.; corn in Minn. and Iowa; and beans in Va.

Test work shows that chemical protection will usually increase stands and yields by reducing losses from seed decay and seedling blight caused by many seed-borne and soil-borne organisms. Where seed-corn maggot and certain soil insects feed on seed and germinating seedlings, dieldrin gives considerable protection. However, where there is heavy infestation of such soil insects as wireworms, it should be fortified by broadcasting suitable insecticide over the soil before planting treated seed.

"Delsan" AD seed protectant may be applied as a slurry with a standard slurry treater, or the slurry may be mixed with seed in a barrel treater or on a floor. Material is applied at the rate of 1¼ ounces per bushel of field corn seed, and 1-3/4 ounces per bushel of sweet corn, bean, or pea seed. *Product Information Service*, E. I. DuPont De Nemours & Co., Jan. 28, 1955.

•

Control of Damage by Drift

How can farmers or applicators prevent chemical drifts or vapors from damaging crops or livestock? This question is asked by Vergil Freed, agricultural chemist at the Oregon State College of Agriculture, Corvallis, Oreg. Most trouble, he says comes from hormone weed killers, 2,4-D and 2,4,5-T and it is difficult to say if the damage could have been avoided, since careful, experienced operators have had trouble. In the station's winter quarter issue of "Oregon's Agricultural Progress" Dr. Freed discusses in simplified form the physical characteristics of sprays and chemical vapors with the thought that if farmers understand drift and volatility, it will help reduce the damage bill. Summing up his findings, he suggests the following: (1) Spray only on calm days; (2) Use nozzles that deliver a large-sized droplet and only enough pressure so the nozzle operates properly. Under most conditions this means, he says, a pressure of 20 to 40 lbs. per sq. inch, with each nozzle fixed to deliver not less than 1 quart per minute; 3-Use non-volatilizing materials whenever possible.

•

Fertilizer Drill Maintenance

It doesn't take long, under humid conditions, to rust out a fertilizer drill in which some of the fertilizer material has been left. Breakage of drill parts often results from such neglect. Whenever the drill is out of use for an extended period, it should be run free of fertilizer and the box and mechanism cleaned by hosing it out with water under pressure, advises Houston Luttrell, assistant extension agricultural engineer.

•

Captan Use Growing

In the eastern fruit belt, over 90 per cent of the apple growers in Maryland used captan as their fungicide in 1954. Smoother peaches with more color were reported.

In Santa Cruz county, Calif., strawberry plots treated with captan five per cent dust at the rate of 35 pounds per acre gave an 83 per cent reduction in rot.

In the Pacific northwest, good control of bulls-eye rot was achieved with captan. Apples treated showed 0.5 per cent rot at the final inspection, compared to 12 per cent ordinarily.

At the University of California, captan used as a seed protectant together with lindane to control wireworm and seed corn maggot damage on Fordhook lima beans was as effective as other fungicides under ordinary conditions and more effective under adverse cold and wet weather. Tests indicate the captan-treated seed may be planted 15 to 30 days earlier than is normally considered good practice. *Farm Management*, Vol. IV, No. 1, Jan. 1955.

Seed-Corn Maggot Control

Emergence counts indicated that a fungicide and an insecticide must be combined to control both the seed-corn maggots and seed-decay organisms. Lindane and dieldrin were used with either a fungicide or an inert carrier to treat seed of green pea, spinach, onion, cotton, and nine varieties of cucurbits. Tests showed these compounds to be equally effective in controlling seed-corn maggots at the three dosages tested. Lindane and thiram combinations give better seed protection than other treatments. *Journal of Economic Entomology*, Vol. 47, No. 6, pages 1040-1045.

•

Fumigant Fertilizer Application

Cotton growers in Arkansas report successful application of anhydrous ammonia and ethylene dibromide to the soil at the same time and from the same rig. The two chemicals are fed from two tractor-mounted tanks through separate hoses with outlets set about two inches apart on the chisels. Ammonia is applied uniformly to each field under test, while the ethylene dibromide is applied only in the areas where wilt has shown up in previous seasons. No evidence of incompatibility was noted. B. J. Thiegs and H. A. Nation, *Down to Earth*, Vol 10, no. 3, Winter 1954.

•

Insects Develop Resistance

Failure of organic insecticides to control the cotton leafworm and various species of spider mites was noted in recent use of these products. Also reported were relatively poor effects on the boll weevil, bollworm, cotton aphid, and several others.

Results of a screening program showed that toxaphene, evaluated against cotton insects had progressively less effect. In toxicity tests conducted against the tumid spider mite, higher dosages of parathion and several of the other phosphorus compounds were required than in previous years. Cotton aphids offered no increased resistance in successive treatments, nor did bollworms and boll weevils. *Journal of Economic Entomology*, Vol. 47, No.6, Pages 981-984 (1954).

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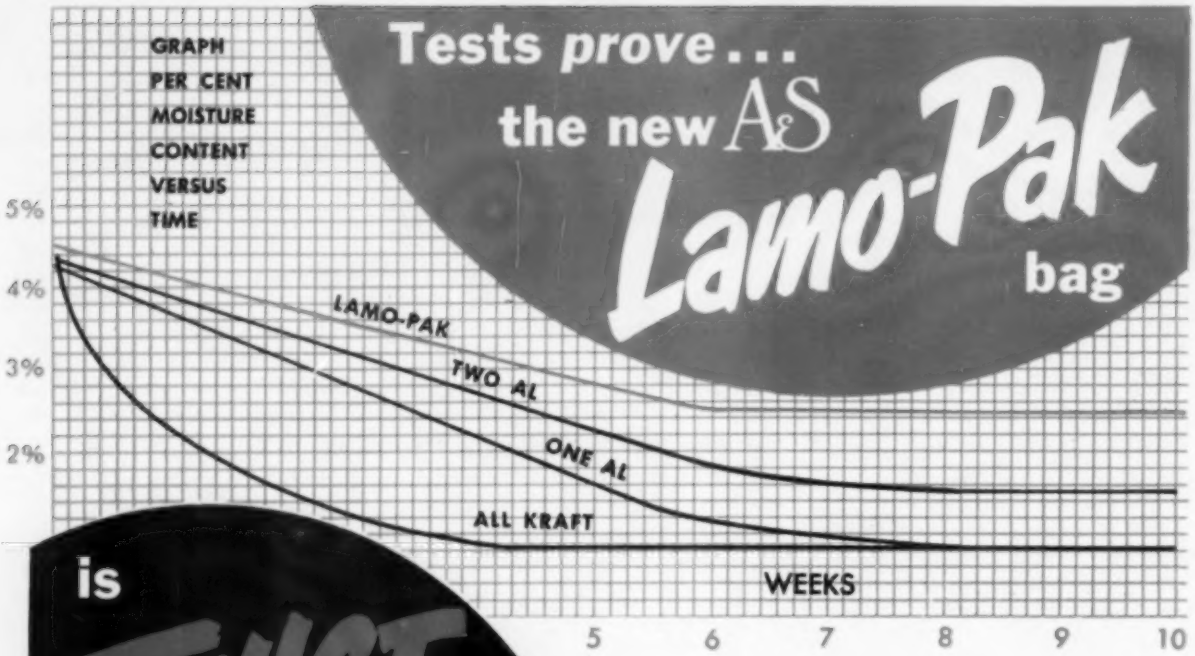

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Canadian Pest Control Developments

RECENT Canadian developments in pest control are covered in a series of articles appearing in issues of *Canadian Chemical Processing*, authored by members of the technical committee of the Canadian Agricultural Chemicals Association. In one article of the series J. W. Busch reviews the background of the insecticide industry in Canada.

He points out that just as in the U.S., DDT made great headway in insect control in Canada in the early '40's; followed by methoxychlor, lindane, and BHC . . . with the accompanying development of fly resistance to these pesticides. The Canadians, too stressed a program of rotating pesticides to avoid building up of resistance. Other insecticides added in recent years to the line of pesticides for control of soil insects include chlordane, aldrin, dieldrin, heptachlor and endrin.

In the field of herbicides, 2,4-D followed by 2,4,5-T have been the most progressive steps to date in the control of weeds. The chemicals are used in the ester or amine forms.

Pre-emergence treatments using chemicals such as Alanap for cucurbit crops and cloro IPC for strawberries and asparagus are another illustration of the advance in herbicides.

Substituted urea chemicals like CMU, are valuable as soil sterilants, with CMU also being used as a selective herbicide on asparagus.

A group of carbamate chemicals —Ferbam, Ziram, Zineb, Nabam and Maneb, introduced in the 1930's, still are effective in fighting disease in the field and orchard. Later developments of fungicides include phygon, glyodin and captan.

Mercury compounds are still being used in the seed treatment field, however products like captan, spergon, vancide and phygon show promise for selected vegetable and field crop seeds.

Developments in the embryonic stage are the use of antibiotics and systemics. Aureomycin and streptomycin for fire blight on pears and for cherry leaf spot, are typical new applications.

Maleic hydrazide, a plant response chemical, will prevent sprouting during storage and has been effectively used on potatoes.

—J. W. Busch, "Recent Developments in Pest Control," *Canadian Chem. Processing*, Sept., 1954.

Pesticide Formulation

MAJOR liquid concentrate formulation problems include: solvent power of solvent used for pesticide and solubility of pesticide; phytotoxicity; effect of solvent on the chemical stability of pesticides; emulsifying agents and emulsion stability; use of auxiliary solvents; crystallization in storage; and effects of water hardness, temperatures and dilution rates.

Problems encountered in formulating wettable powders are: grinding and equipment problems; wetting, dispersing and suspension agents; flowability; oversize; diluents; particle size; stability on storage and of spray mixture; settling rate of suspensions; and impregnation of liquids.

Discussion of these problems by H. A. Pass and D. A. Pearce, Green Cross Products, Montreal, with some explanation as to causes provides basis for new approach to formulation of pesticides.

It was found desirable to use a solvent for DDT which tends to depress the formation of free hydrogen chloride, since DDT under some conditions can release a small quantity of hydrogen chloride (when certain chlorinated hydrocarbons, also nitrobenzene, are used as solvents), which may react with traces of ferric oxide in the container to form ferric chloride, setting up a chain reaction, accelerating DDT decomposition further.

Other chlorinated insecticides such as chlordane, toxaphene and technical aldrin are known to exhibit hydrogen chloride formation, according to the authors. Especially interesting is the use of unsaturated materials such as epichlorohydrin and propylene oxide in small quantities as hydrogen chloride acceptors. These react with the hydrogen chloride released by the pesticide to form an addition product and thus stop the chain reaction involving ferric chloride, before it begins.

The exact nature of the decomposition of malathion in the presence of metals and metal salts is not fully known.

Auxiliary solvents used to prevent separation of emulsifier ingredients on storage or to make the emulsifier soluble in the formulation include cellosolves, carbitols and other higher alcohols. To lower the freezing point of a product, the principle of mixed melting points is applied, the active ingredients themselves functioning as auxiliary solvents. A recent patent covers the mixing of isomeric esters of 2,4-D and/or 2,4,5-T to depress the freezing point.

—H. A. Pass and D. A. Pearce, "Pesticides . . . How Formulation Problems Are Being Solved," *Canadian Chem. Processing*, December, 1954.

$50 Million Spent on Pesticides

RECENT estimates indicate that Canadians lose up to two billion dollars annually from weeds, insects and disease, according to A. W. Lougheed, Naugatuck Chemicals, Ont.

Major losses, he said, are due to weeds in crops; insects on livestock; diseases of grain and vegetables; insect and disease attacks on fruit, vegetables and grain.

Canadians spent up to 50 million dollars in 1953 on pesticides, equipment and their application, and gained a return of 500 million dollars in increased food production, according to recent estimates.

Abnormally high rainfall in Western Canada in the summer of 1954 reduced acreages normally treated with 2,4-D by 30-35 per cent.

Because of extremes of climate in Canada, basic materials and the formulated materials require special study to assure satisfactory performance in the field. The use of aromatic solvents overcame the problem of limited solubility of DDT at low temperatures. Many materials are prepared as wettable powders because

(*Continued on Page* 119)

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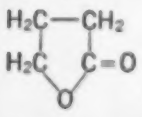
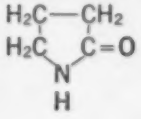
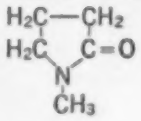
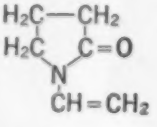
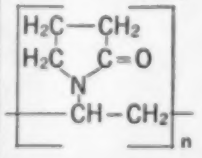
2-BUTYNE-1, 4-DIOL $HOCH_2C{\equiv}CCH_2OH$	Reacts as a glycol and di-substituted acetylene. Chemical intermediate for solvents, plasticizers, plastics, etc. Corrosion inhibitor and stabilizer for halogenated compounds.
1,4-BUTANE-DIOL $HOCH_2CH_2CH_2CH_2OH$	Reacts as dihydric alcohol. Chemical intermediate for polyesters, polyurethanes, polyamides and cyclic compounds. For plasticizers, resins, fibers, etc. Solvent and humectant.
BUTYRO-LACTONE 	Powerful organic solvent for polyacrylonitrile, cellulose acetate, polystyrene, etc. Selective solvent for acetylene in natural gas. Chemical intermediate for aliphatic and cyclic compounds.
2-PYRROLIDONE 	Polymerizes to high molecular weight, linear, nylon-type, polyamide condensation product. Gives γ-aminobutyric acid and derivatives, also N-acyl lactams.
N-METHYL-2-PYRROLIDONE 	Powerful organic solvent for acrylonitrile polymers and copolymers, cellulose triacetate, etc. Selective solvent for acetylene in natural gas. Spinning agent for polyvinyl chloride solution.
N-VINYL-2-PYRROLIDONE 	Will copolymerize with almost all vinyl monomers. Permits modification of many properties in existing homopolymers. Gives control of hydrophobic and hydrophilic properties of products.
POLYVINYL-PYRROLIDONE (PVP) 	Binder, stabilizer, detoxifier, protective colloid, thickener, film former. Physiologically compatible. Wide solubility range. For use in pharmaceuticals, cosmetics, foods, detergents, dye stripping, synthetic fiber additive, size component, lithography, agricultural chemicals, etc.

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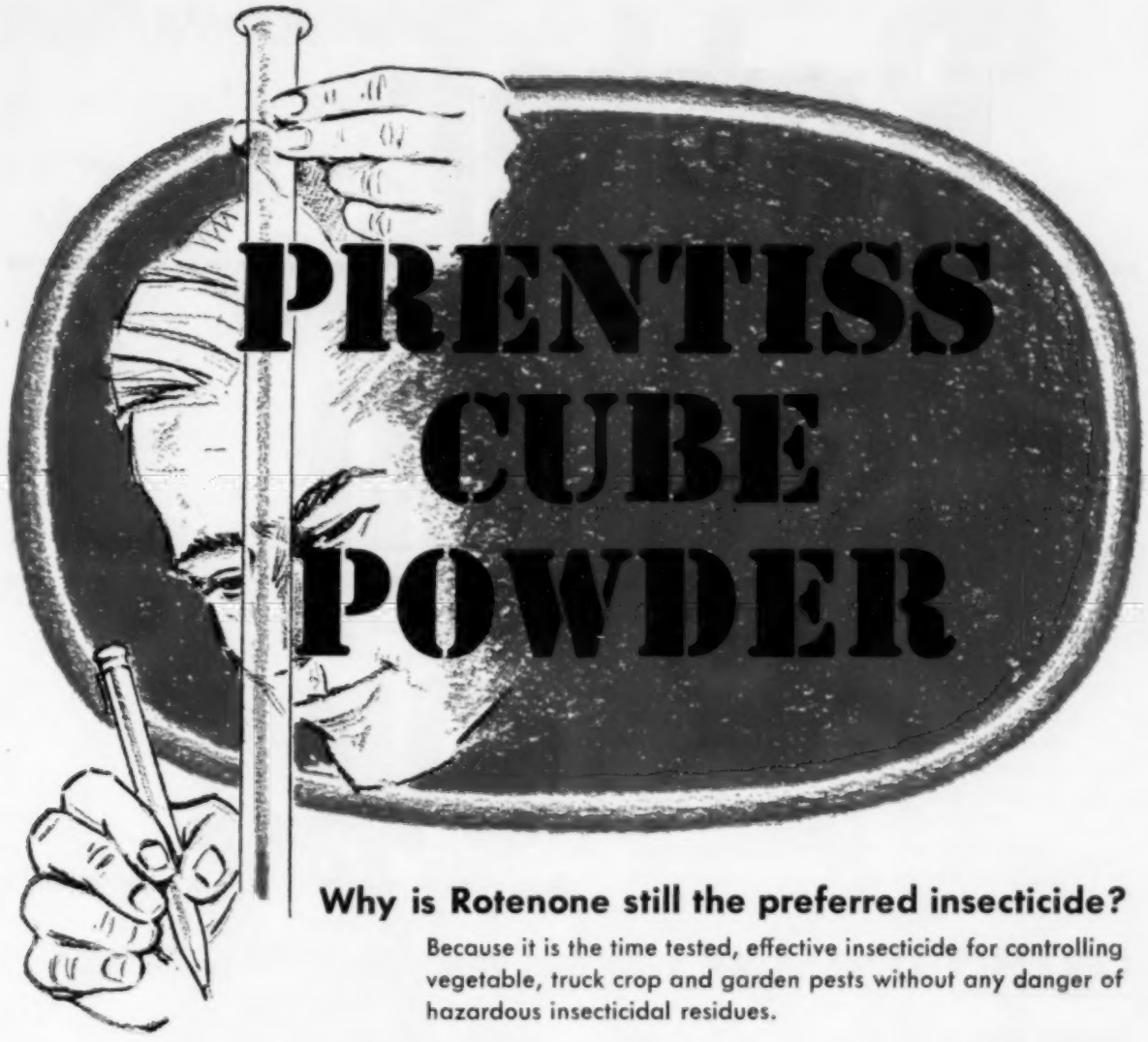

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INDUSTRY News

V-C, Diamond Form New Co.

Virginia Carolina Chemical Corp., Richmond, and Diamond Alkali Co., Cleveland, have announced formation of a new corporation to take over manufacture and marketing of "Black Leaf" brand agricultural chemicals and pest control products.

The new firm will be known as Diamond Black Leaf Co. It will be managed by Diamond Alkali, who will hold the major interest in the new firm, with Virginia-Carolina holding a minority interest. Under the agreement, Diamond Alkali will acquire Virgina-Carolina's interest in the company over the next five years.

Loren P. Scoville, general manager of Diamond's chlorinated product division, has been named president of the new company. Dr. Bruce D. Gleissner, assistant general manager of Diamond's chlorinated product division will be vice president of Diamond Black Leaf Co. They will also continue in their present position with Diamond Alkali Co.

John W. Kennady will be general manager of Diamond Black Leaf Co.

•

Mass. Firm Appoints Prigmore

W. H. Prigmore, who has been in charge of purchasing and production for the spray-dust service of Eastern States Farmers' Exchange, Inc., West Springfield, Mass., recently was named director of purchasing and production for the entire organization. Philip S. Catin, who has been associated with Mr. Prigmore will be in charge of purchasing for the spray-dust division.

•

Nitrogen Group to Hold Conf.

The first annual meeting of the Nitrogen Solutions Association, to be held March 14-15, Omaha, Neb., at the Paxton Hotel will be devoted to all phases of nitrogen solutions, equipment for storing and handling solutions and analyses of the 1955 outlook for nitrogen in agriculture.

•

Borax Names Dibble

W. J. Dibble has been appointed general sales manager, Western Division of Pacific Coast Borax Co., Division of Borax Consolidated. In his new position Mr. Dibble will be responsible for industrial sales in the western states and have the over-all direction of the agricultural sales division. It was also announced that E. M. Kitchen has been appointed industrial sales manager of the western division.

•

Rohm & Haas Files Charges

A patent infringement suit was filed on February 16 by Rohm & Haas Co. against Roberts Chemicals, Inc., Nitro, W. Va. The suit, charges infringement of U. S. Reissue Patent 23,742 under which the Rohm & Haas Co. sells its "Dithane" brand-fungicides.

This action follows the filing by Rohm & Haas several months ago of an infringement suit on the same patent against E-Z Flo Chemical Co., Lansing, Mich. and its affiliate, Diamond Fertilizer Co., Sandusky, Ohio.

Stauffer Advances Loring

Charles Loring has been appointed eastern district sales manager of the industrial chemical division of Stauffer Chemical Co., New York. During his ten years with Stauffer, Mr. Loring has been in domestic and export sales and has been a product sales manager of the industrial chemicals division. He will be in charge of sales of industrial chemicals in the New England, Central, and Southeastern states.

•

NFU Plans Fert. Program

Establishment of a nation-wide system of formulating-mixing plants for the manufacture of fertilizer is part of a $25 million, ten-year expansion program contemplated by the National Farmers Union. The program was announced by NFU president James G. Patton at the annual convention of the Rocky Mountain Farmers Union held recently in Denver, Colo.

Plans for processing plants for potash, phosphate and nitrogen are also underway. The organization has 14,000 acres under lease in New Mexico, which will be in the commercial production of potash by 1956.

•

Cherry Heads Colo. Ag Group

W. E. Cherry, Rohm & Haas Co. was elected president of the Colorado Agricultural Chemicals Assn. at its 4th annual meeting late in January in Denver, Colo. R. Farr, Greeley, Colo. was elected vice president and O. Schall, Monte Vista, Colo. was elected secretary-treasurer.

Conn. Fruit Growers Meet

Connecticut fruit growers discussed pest control problems and marketing at their annual meeting, held Feb. 24 at the Connecticut Agricultural Experiment Station, New Haven. Feature of the pest control session was a panel discussion of insecticides and fungicides, led by Dr. Philip Garman, station entomologist. Also included was a review of the 1955 spray program by William Tunis, extension entomologist at the University of Connecticut.

•

Potomac Division, APS, Meets

A symposium on "Fungicides—Past, Present and Future" was presented at the annual meeting of the Potomac Division of the American Phytopathological Society, Beltsville, Md., March 3-4. Dr. J. W. Heuberger was moderator.

Highlight of the program was a talk by Lea S. Hitchner, executive secretary of the National Agricultural Chemicals Association. Mr. Hitchner reported on "Legal and Moral Aspects Encountered in the Use of Pesticides," with emphasis on the implications of the recently passed Miller amendment.

•

Pesticide Dealers Meet

A series of district meetings on the use of insecticides and insect control is being sponsored by the state of Louisiana extension service. Meetings have been held at Shreveport, Feb. 8; Alexandria, Feb. 9; New Orleans Feb. 23; and Hammond, Feb. 24, all in Louisiana. The final meeting for the current series is scheduled for March 15 at Opalousas, La.

The purpose of the meetings is to present dealers with information that will be of help to them in the marketing of pesticide products. Topics cover pesticide recommendations, sales techniques, tolerances and the state services for farmers and dealers.

Feature event at both the Shreveport and Alexandria meetings was a panel of industry representatives discussing "How the Companies Can Help the Retailers." Panel members were Dr. C. C. Doane, Shell Chemical Co., leader; Charles King, Geigy Agricultural Chemical Co.; W. B. Parker, Chipman Chemical Co.; and Leonard Edwards, Hercules Powder Co.

•

Intl. Min. Expands

A $42,000,000 expansion and modernization program was completed recently by the Potash Division of International Minerals & Chemical Corp., at its Niagara Falls, New York, plant.

The program, which was begun two years ago, has increased the capacity of the basic chlorine caustic potash plant by 25 per cent and has doubled the capacity to produce liquid caustic potash and potassium carbonate. The plant also has a new unit which produces 60 tons per day of 20° be hydrochloric acid.

•

Standard To Have NH_3 Plant

Anhydrous ammonia and ammonium nitrate solutions will be produced by Calumet Nitrogen Products Co. at Hammond, Ind. upon completion of a new plant in mid-1956. Calumet Nitrogen is a subsidiary of Standard Oil Co. of Indiana and Sinclair Oil Corp. The ammonia will be manufactured from by-products of their nearby refineries. Construction will start early this spring.

•

Am. Cyanamid Appoints Hunt

Ernest K. Hunt has been named public relations manager of American Cyanamid Co., New York. Mr. Hunt has been with Cyanamid for 11 years, serving as advertising manager and manager of the Household Products Dept. of the Calco Chemicals Division. Before joining Cyanamid, he was with International Paper Company's Veldown Co.

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CIL Opens Chem. Center

Anhydrous ammonia, calcium for plant refrigeration, and other industrial chemicals will be handled at a distributing center recently established in Regina, Saskatchewan, Canada, by Canadian Industries (1954), Ltd.

Kever Joins Hayes-Sammons

The Hayes-Sammons Co., Mission, Texas, has announced the appointment of J. Warren Kever to its managerial staff

Mr. Kever has worked two years with the California Agricultural Exment station and has spent the last three years with a California fertilizer company, specializing in the manufacture and distribution of liquid fertilizers.

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High N Production at CCA Plant

A cooperative nitrogen fertilizer plant at Lawrence, Kan., reports production of 3,500 tons of ammonium nitrate during January. J. W. Wadsworth, superintendent, announces that production should reach the estimated capacity of 7,500 tons in March. The anhydrous ammonia figure for January was 2,400 tons against an estimated capacity of 5,250 tons. The plant was opened in September, 1954.

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Federal Names Courtenay

Frederic H. Courtenay was recently elected secretary of Federal Chemical Co., Louisville, Ky. After joining Federal in 1950, Mr. Courtenay worked in the production and sales departments at three of the company's plants. He is a native of Louisville and graduate of Harvard.

The company has announced also the appointments of Clark L. Kelly, Jr. as assistant treasurer and Woodford N. England as advertising manager.

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CCA Expands Fert. Staff

Warren E. Dewlen, special fertilizer fieldman for the Cooperative Consumer Association in the Kansas-Oklahoma area, has been placed in charge of all CCA ammonium nitrate distribution. His former position has been taken over by Paul Boulware, who is new to the organization. Another new man with the CCA is Wallace DeLong, formerly an agriculture instructor. He will be field representative for the area served by the fertilizer plant at Eagle Grove, Kansas.

Allstetter Addresses Farmers

Americans need have no fear of food shortages in the foreseeable future, W. R. Allstetter, vice president of The National Fertilizer Association, told farm audiences in Tennessee early last month.

Mr. Allstetter was one of the principal speakers at regional meetings of fertilizer and seed dealers and professional agricultural workers sponsored by the University of Tennessee. Meetings were held in Nashville February 8, Jackson February 9, and Knoxville February 11.

Attacking those who fear that the nation's farm plant will not be able to keep pace with the increasing population, Allstetter stated: "I have no doubt of the capacity of American agriculture to produce enough food for us, our children, and our children's children."

Mr. Allstetter quoted from studies conducted by the University of Tennessee to show that Tennessee farmers, by using recommended additional amounts of fertilizer along with a moderate improvement in general farming practices, could "rather easily" meet a 50 per cent increase in the demand for the agricultural products they grow.

"With more research and education, with better land use, this 50 per cent increase will look very modest long before our population increases by 50 per cent," he stated. He also cautioned farmers that, for this reason, they cannot depend on population increases to solve automatically their surplus problems.

Mr. Allstetter presented figures to show that at recommended rates of fertilizer, profit per bale of cotton produced in Tennessee could be increased on the average by 165 per cent, as the result of a 47 per cent increase in yields. Consequently, Tennessee farmers could realize as much profit from 39 bales of cotton grown on only 39 acres as they presently realize from 68 bales of cotton grown on 100 acres, he explained.

"Somewhere between this 39 acres of high yielding cotton and 100 acres of cotton at average yields, we can meet market demand and raise farm income at the same time," he pointed out. Similar figures were presented for corn, wheat and tobacco showing that in each case total production could be reduced substantially without lowering farm income.

Meeting Calendar

March 7-9 — National Agricultural Chemicals Association, Spring Meeting, Chase & Park Plaza Hotel, St. Louis, Mo.

March 8-9 — Western Cotton Production Conference, Hotel Westward Ho, Phoenix, Ariz.

March 14-15 — National Nitrogen Solutions Assn. First meeting, Paxton Hotel, Omaha, Neb.

March 15—Insecticide Clinic, sponsored by Extension Service, Louisiana State University and Mechanical College, Opelousas, La.

March 22-24—National Farm Chemurgic Council, Dashler-Hilton Hotel, Columbus, Ohio.

March 24-25 — N. Central States Branch, E.S.A., East Lansing, Mich.

March 29-April 7—American Chemical Society, national meeting, Netherland Plaza Hotel, Cincinnati, O.

April 26 — Spring Fertilizer Conference, sponsored by the Soil Improvement Committee of the California Fertilizer Association, Campus of the University of California, Davis, Calif.

May 15-17—Chemical Specialties Manufacturers' Assn., Statler Hotel, New York

May 19 — Fertilizer Section, 25th Annual North Carolina Safety Conference, Winston Salem, N. C.

June 3 — Fertilizer Section, Virginia State Safety Association, Richmond, Va.

June 12-15 — National Plant Food Institute Convention (joint meeting of APFC and NFA), The Greenbrier, White Sulphur Springs, West Va.

June 28-30 — Regional Fertilizer Conference, Pacific Northwest Plant Food Association, Boise Hotel, Boise, Idaho.

June, 3rd wk.—Pacific Slope Branch, E.S.A., Mission Inn, Riverside, Calif.

Sept. 7-9—National Agricultural Chemicals Assoc., Annual meeting, Spring Lake, N. J.

Nov. 7-8—California Fertilizer Assoc., 32nd annual meeting, Hotel Mark Hopkins, San Francisco.

Nov. 29-Dec. 2 — Entomological Society of America, Annual Meeting, Netherlands Plaza, Cincinnati.

Durham Chem. Has New V. P.

Earle Stevens has been made vice-president and general manager of Durham Chemical Co., Los Angeles, effective Feb. 14. He has been with Durham since 1946.

Recently announced additions to Durham's staff are Fred DeGraw, who has been hired to cover the Southern California sales territory, and O. T. Coffin, who will serve as chief consultant for field crops in the Southern California area. Mr. Coffin will also continue as head of the research and entomological department.

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Three Appointed at DuPont

E. I. du Pont de Nemours & Co., Wilmington, Del., recently added Bernard A. McCabe, Clinton B. Harris, Jr. and Gordon P. Robinson to its garden chemicals sales force. McCabe transferred from the company's fabrics and finishes department to cover the northern New Jersey and northeastern Pennsylvania territory of the garden section of the Grasselli Chemicals department. Mr. Harris and Mr. Robinson are new to the firm. Mr. Harris was assigned to the greater Cleveland area and the Lake Shore section of western New York. Missouri, eastern Kansas and southern Illinois will be handled by Mr. Robinson.

•

S. C. Fertilizer Meeting

The annual South Carolina fertilizer meeting will be held at the Sandhill Experiment Station, Branch of Clemson Agricultural College, Columbia, South Carolina on June 2, 1955. Fertilizer manufacturers, dealers, salesmen, and other interested agricultural workers are expected to attend. The morning will be devoted to touring the experiment station on trucks. During the afternoon, the group will be shown through the new animal diagnostic laboratory which is operated by the U. S. Department of Agriculture, Animal Disease Eradication Branch and the Clemson Agricultural College, Livestock Sanitary Department. This laboratory is located at the Sandhill Experiment Station.

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Midwest Soil Improvement Conf. Feb. 17-18

By H. H. Slauson

FERTILIZER industry representatives and college agronomists from 13 midwestern states reviewed current problems together at the 26th annual meeting of the Middle West Soil Improvement Committee held at the Palmer House in Chicago, Feb. 17 and 18. Results from new projects at the colleges on use of fertilizers, and a discussion of factors for increasing efficiency in crop production were presented at the 2-day session.

Outstanding interest was taken in the talk by Russell Coleman, president of the National Fertilizer Association on how to reduce crop surpluses by using more fertilizer, a theme with which readers of this magazine are already familiar.

In substance, Mr. Coleman argued that if farmers would follow the fertilizer use recommendations of their state agricultural colleges, they could comply with acreage reduction requirements of the USDA and still make more money.

The basic problem, Mr. Coleman said, is not how to adjust production to demand, but how to do it without reducing net farm income. If commercial fertilizers are properly used, along with other improved practices, he asserted, both problems can be solved. The idea, it was suggested might be of interest to the Secretary of Agriculture.

Taking the nation's problem crop, wheat, as an example, Mr. Coleman advised that total midwestern production could be reduced 20 percent—from the current production of 557 million bushels to 443 million—without reducing the wheat farmer's net income. This, he said, could be accomplished by increasing use of plant food from the current average of 26 pounds per acre to the recommended 86 lbs. Wheat yield per acre would be increased from the present average of 18 bushels to 30 bushels. Instead of making 40 cents per bushel net profit, farmers would actually realize 52 cents and total profit from the reduced production would be "as great as currently realized," Mr. Coleman said.

In an exploration of "Yield Potentials of Corn Belt Crops" Dr. M. B. Russell, Univ. of Illinois, pointed out that some farmers raise 100-bushels per acre corn crops. "Why don't all of them do it?" he asked.

The lack of plant nutrients is not the sole factor contributing to the variations in yield, he contended. Others are such things as volume and distribution of rainfall, crop rotations, disease, etc. But analysis of 800 reports received by the college in a Farm Bureau-Farm Management extension project, he said, showed that only about 50 per cent of the variations could be attributed to ten specified limiting factors.

Figuring what might be the yield if these ten factors were controlled by reasonably high management practices, he estimated that Illinois yield might be 90 bushels, and that the potential of a large part of Illinois might be at least 75 bushels instead of the present 50 bu. per acre average. Some farmers, he declared, should be cribbing 115 to 125 bushels per acre every year, if good management practices were followed.

"To the extent that the farmer understands the variables, and uses that knowledge, Dr. Russell declared, "only in that proportion will we move to the point of reasonable expectations."

Fertilizer manufacturers share with the colleges the responsibility for helping the farmers to move to this full potential level, he asserted. He recommended an intensified cooperative educational program to familiarize the farmers with the possibilities for improving yields through a fuller understanding of how to control the limiting factors.

Poor nutrition is often the cause of alfalfa crop failure, Prof. O. J. Attoe, Univ. of Wisconsin, Madison, maintained, in a paper on "How Long Will Alfalfa Stands Last?" He told of a Wisconsin soil building program through which land once thought too poor to produce alfalfa is now producing money making hay crops for the seventh year in a row. Alfalfa yields up to 4 tons per acre have been harvested on land built up by good soil building practices, which included lime and high potash fertilizer and, for every dollar invested in fertilizer, returns have been $4 to $5, he said.

"From all indications," Dr. Russell added, "the fertilized alfalfa stands will remain productive for some time to come by top dressing with a high potash fertilizer, such as 0-10-30."

The old problem of when to apply fertilizer was settled in Minnesota with the conclusion that application in the fall gives just as good results as spring application, Dr. J. M. MacGregor, Univ. of Minnesota, St. Paul, reported. Some advocates of fall fertilization, he added, usually suggest use of a starter fertilizer at corn planting time in the spring.

"There is no conclusive proof, "Dr. MacGregor said, "that late fall application of nitrate nitrogen to typical corn belt soils will result in serious loss over winter."

As to placement of fertilizer for corn, he said it is not as important as sometimes considered, provided the fertilizer is not in direct contact with the seeds.

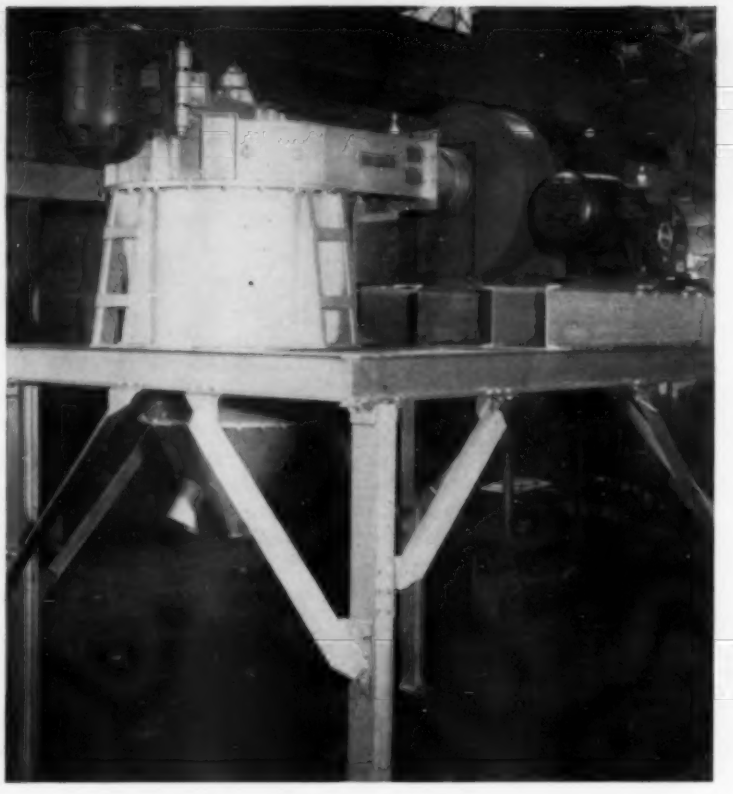
Prof. John R. Webb, Iowa State College, Ames, in a paper on "Significance of Water Solubility in Phosphate Fertilizer," stated that fertilizers with high water soluble phosphates will give more bushels of corn and oats per acre, than those with low water solubility, when the fertilizer is used in the hill for corn and in the row for oats. If broadcast and plowed under or disced, he said, the advantage of high water solubility disappears almost entirely, there being almost no difference in yields.

Phosphates high in water solubility, used in the row, increased corn yield nearly three times greater that when solubility was lowest. When high water soluble phosphate was

(*Continued on Page* 114)

NEW TYPE STURTEVANT AIR SEPARATOR

Recovers Fines in Micron Ranges



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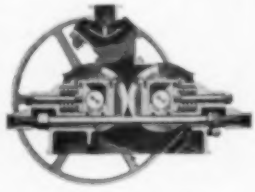

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Build Ammonia Plant in Minn.

Construction of a $15 million ammonia plant is expected to commence shortly on a 250 acre site close to St. Paul, Minn. It will be built by St. Paul Ammonia Products, Inc., a firm recently organized by a group of Canadian investors. The site is adjacent to a $25 million petroleum plant being built by Great Northern Oil Refinery Corp.

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Frontier Chem. 1st Anniversary

Frontier Chemical Co., Wichita, Kansas, reecntly completed its first year of operations in the agricultural chemical field. Its new and modern plant for production of technical benzene hexachloride ran at capacity throughout 1954. Changes made in process are reported to have resulted in a definitely improved product as compared with that produced by the predecessor company, Tennessee-Frontier Corp. Special claims are made for superior qualities of product grindability, gamma content, service on deliveries, etc.

At the year end, Frontier concluded a merger with Union Chemical and Materials Corp., which will lend additional financial strength to the Frontier set-up, and in all probability lead to additional ventures in the agricultural chemical field.

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Brea Names Mexico Firm

Brea Chemical Co. recently disclosed that Quimica Agricola del Pacifico, Mexicali, Mexico, a subsidiary of Durham Chemical Co., Los Angeles, has been selected to handle distribution of Brea fertilizers in Baja, California.

•

Advise Location for NH_3 Prod.

Anhydrous ammonia could be produced economically in the Lower Wabash River Valley in southwestern Indiana and southeastern Illinois, by utilization of surplus natural gas, which is available to the area in summer, according to a report published by the Chicago & Eastern Illinois Railroad, Chicago.

The 460 page report mentions that Tennessee phosphate rock already is produced in the area in considerable quantity, but that this production does not satisfy local fertilizer requirements because of the lack of nitrogen ingredients.

•

Douglas Appoints Kirk

The appointment of Joseph L. Kirk, former vice president of Carman & Co., to the newly created post of director of sales and advertising for the Douglas Chemical Co., was announced by W. C. McCaslin, executive vice president.

Douglas Chemical Co., manufacturers of fumigants, insecticides and agricultural chemicals, has executive headquarter offices in North Kansas City, Missouri.

•

Bemis Mgr. to Retire

F. W. Copley, manager of the Buffalo plant and sales divisions of Bemis Bros. Bag Co., has announced plans to retire March 31st. He will be succeeded by A. S. Roper, who is now assistant manager.

Grace to Assist N Research

A grant-in-aid program for research in nitrogen plant foods and animal feeds was announced last month by Grace Chemical Co., New York. The program will support both fundamental and applied research in two major fields: nitrogen nutrition of ruminant animals and soil reactions and crop use of nitrogen fertilizers. For the current academic year Grace has allocated a total of $20,000 to the research funds of seven land grant colleges and experiment stations.

•

Int'l. Min. to Mine in Canada

International Minerals & Chemical Corp., Carlsbad, N. M., has been granted six potash withdrawal areas in Saskatchewan, Canada. This brings to three the number of Carlsbad companies acquiring potash rights in Saskatchewan. Others are Potash Co. of America and Duval Sulphur & Potash Co.

Chemicals In Foods Discussed

One of the most urgent needs of the veterinarian is for a spray which can be used around barnyards to kill the larvae and eggs of the multitudes of parasitic organisms afflicting farm animals. Speaking in Chicago, at the Edgewater Beach Hotel, Dr. Roger P. Link of the department of veterinary medicine, Univ. of Illinois, Urbana, Ill., offered this suggestion to chemical manufacturers gathered for the joint meeting of the Commercial Chemical Development Association and the Chemical Market Research Association held late in January.

Members of the two organizations sponsoring the joint conference are professionally engaged in the commercial introduction of new chemicals and development of new uses for old chemicals. Deliberations on the program centered on the theme "Chemicals in Foods and Feeds." Not much was said about chemicals used by agriculture in producing the crops for the food processors.

Dow Chemical Co's market research manager, Parker Frisselle, did, however, pay brief attention to the part played by agricultural chemicals in a paper on "Chemicals in Packaging and Preservation of Foods.

The subject, he said, embraces a very large field and he went on to list a few, such as chemical fertilizers, insecticides, fungicides, herbicides, hormones, soil fumigants, seed protectants, veterinary chemicals, rodenticides, cleaning and sanitizing agents, water treatment chemicals, and so, on, right down to "silver iodide which preserves food by causing rain to fall on dry areas." Most of his ensuing remarks dealt with food additives and fumigants used on packaged foods.

From Lawrence Coleman, head of the legal department of Allied Chemical & Dye Corp., came a suggestion that Congress should enact a law which would fix tolerance levels for food additives, to insure their safe use. Such a measure, he said, would be similar in intent to the recently enacted Miller Pesticide bill in which, he pointed out, Congress gave "philosophical" recognition to the fact that while pesticides, as such, are poisons, they can be used on raw agricultural products, provided they do not exceed a safe tolerable amount.

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. . . or cotton, as it is known to most of us, is one of the oldest and most beneficial crops known to man. Today with the scientific application of modern commercial fertilizers, cotton yield per acre is greater than ever before.

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Canners to Discuss Pesticide Problems

SPECIAL sessions on pesticide tolerances were an important feature of the program for the 48th annual convention of the National Canners Association, held in Chicago, Ill., February 18 and 19.

A session on pesticide tolerances included a panel discussion on factory quality control aspects of pesticide residues, with D. W. Leepers, H. J. Heinz Co., as moderator. The panel dealt with detection of residues by biological assay techniques, with the following panel members participating: "Purification of Plant Material and Separation of Insecticides for Bioassay" by W. M. Hoskins, Dept. of Entomology and Parasitology, University of California; "Development of a Simplified Bioassay Procedure for Determining Insecticide Residues in Raw and Canned Products" by F. C. Lamb, N. C. A. Western Branch Laboratory; "Residue Determinations Using Lang Bioassay Method and Hoskins Purification Procedure" by C. J. Tressler and T. H. Jenkins, N.C.A. Washington Research Laboratory; and "Determination of Residues on Crops Using Drosophila for Bioassay" by J. E. Dewey, Dept. of Entomology, Cornell University.

The second part of the panel included a report by Elly Hinreiner, University of Calif., on "Effect of Applied Pesticides on Flavor Changes in Canned Foods."

Highlight of the agricultural management meeting was a round table discussion of "The Value, from a Company Standpoint, of a Soil Testing Program, and Field Demonstration in Securing Higher Quality Canning Crops."

The session on pesticides and pesticide tolerances opened with an address by Dr. Charles E. Palm, head of the Department of Entomology of Cornell University, Ithaca, N. Y., entitled "How Pesticide Tolerances May Affect The Procurement of Raw Products." He voiced the hope that final tolerances under the Miller Bill, or exemption from tolerances, may be announced within the next few weeks. Unless an extension beyond July 22, 1955, (one year following signing of the Miller Bill) is granted by the Secretary of the Department of Health, Education and Welfare, growers, agricultural processors and the pesticide industry will become subject to the new regulations in midseason, 1955.

The pesticide industry, the grower and the food processor should all benefit from the new legislation, Dr. Palm observed. The manufacturer of pesticidal chemicals will know the definite procedure to follow in obtaining label acceptance for his products, the grower will know how to appraise the safety of his spray program in terms of safe residue levels at harvest, and the processor will be assured of a dependable supply of high-quality uncontaminated foods for canning.

Beyond the protection accorded by the new regulations, however, Dr. Palm suggested that processors contracting with growers for their crop should work out a definite understanding with them as to what spray programs are to be followed, and should have clearly understood what limitations the packer may find it necessary to place upon specific pesticides. The grower and the processor, he counseled, should be in agreement ahead of the season on the spray program, and any changes in policy during the season should be discussed before there are any changes in the spray schedule.

"It then becomes the responsibility of the grower to do his job well. Almost without saying, it is evident that correct timing of applications is essential to good pest control.

Proper dosage per acre is likewise important for the same purpose and for assuring safe residue level at harvest. The grower, who ignores the warnings on dosage, interval between the last application and harvest, or who leaves applications of pesticides to hired help that will not assume the proper responsibility, has no one to blame but himself if he cannot market his crop. By the same token, the extension or research worker, the sales representative, or other advisor on selection of pesticides for the growers' program, must not go beyond the established procedure in advising farmers to use pesticides on crops for which tolerances have not been established, or label acceptance has not been granted. To do so only invites mis-use and possible seizure of the crop. We have had a few examples of mis-use of effective pesticides, and although good pest control was obtained, the Food and Drug Administration was forced to take action against the crop. Who loses in such instances?—the grower, the processor and ultimately the consumer. It is a needless waste, because the grower should be certain before using any pesticide, that it has approval for his particular use.

"Then there is the example of the occasional farmer who says in effect, 'I don't pay too much attention to all of those rules and regulations—what I want is control—I'll sell my crop all right.' From here on out, such a farmer is constantly open to trouble. Or there is the farmer who decides that he had better make a later application to be certain that the crop is free from pests at harvest, and overlooks the danger of excessive residue. Human nature will not change because of the Miller Bill, but for those who continue to disregard proper procedures in pest control, there can be little sympathy if their crops are seized at harvest and not permitted to move in channels of commerce.

"Responsibility for pest control rests squarely with the manufacturer, the agencies of government that deal with label acceptance of pesticides, and those that make recommendations for their use to farmers. It rests also with those coordinating an acceptance program between the processor and his contracted growers and, last but not least, with the farmer

(*Continued on Page* 134)

This year there will be heavier-than-usual demand for NITROGEN for <u>early</u> spring application

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on pastures . . . Agronomists now agree that *early* spring application of nitrogen means grazing can begin about 10 days earlier, giving *extra* grazing time. In addition, remarkable yield increases result when sufficient nitrogen is used—with more protein per acre.

on wheat . . . . Yields are boosted from 6 to 10 bushels per acre with early spring top dressings of nitrogen.

on corn . . . Since corn requires 2 to 3 pounds of actual nitrogen per bushel, supplemental nitrogen is essential for profitable yields. Broadcast and plow down with USS Ammonium Sulphate is the best way to get that nitrogen deep into the root zone where it will do the most good. Nitrogen strengthens plants for maximum dry-weather stamina.

An important feature of the present widespread nitrogen promotion is *earlier* application. That means that all your dealers must be well stocked as soon as possible.

But don't forget that late winter or early spring high-nitrogen top dressing or broadcast and plow down calls for nitrogen in the non-leaching Ammonia form. So to give your customers top nitrogen value, sell them USS Ammonium Sulphate—both in your mixed fertilizers and for direct application.

USS Ammonium Sulphate is an easy mixer. It is carefully kiln-dried so that it stays free-flowing. It's available in moistureproof, easy-to-handle bags or in bulk quantities for mixing. Order your supply of USS Ammonium Sulphate *now* so that you can be sure of quickest delivery. Don't be caught with your stocks down when the big orders are coming.

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UNITED STATES STEEL

Report on Insecticide Handling

Figures released in January by the California state department of industrial relations indicate a serious situation resulting from the handling of insecticides, particularly parathion, by agricultural workers in that state.

In 1950, reports received by the department's division of labor statistics and research showed that workers had sustained 34 disabling injuries from their use of organic phosphates, specifically parathion, in 1951-52-53 injuries increased to 129, 113, and 73 respectively; and to 65 cases for the first 10 months of 1954.

Alarmed by this evidence of ignorance of how to handle parathion safely, the division's director, M. I. Gershenson, immediately publicized his report widely, coupling it with suggestions for remedying what he rightly termed an unnecessary calamity, and one that could get out of hand, if preventive measures were not adopted.

Accidents from use of various other insecticides have maintained a fairly steady rate as indicated by the annual totals of 156, 157, 160, 171 and 165 for the respective years from 1950 through October, 1954.

•

Announce CFA Conference

The 32nd annual convention of the California Fertilizer Association will be held at the Hotel Mark Hopkins, San Francisco, November 7 and 8, according to a recent announcement by B. H. Jones, association president.

Three convention committees, under the general chairmanship of W. G. Hewitt, Berkeley, are planning to have two speakers of national renown for the conference. Mr. Hewitt has announced that delegates should arrange for reservations at the Mark Hopkins well in advance because the hotel has set aside only a limited number of rooms.

•

Stauffer Opens Texas Plant

Stauffer Chemical Co., New York, has completed a modern insecticide and fungicide blending plant at Lubbock, Texas. The Lubbock plant will serve western Texas and New Mexico, and replaces Stauffer warehouse facilities established three years ago in the same area. The new plant facilities incorporate modern pesticide blending and packaging techniques.

•

Grand River Appoints Mgr.

Dr. William L. Garman, Ithaca, N. Y., has been appointed agricultural service manager of Grand River Chemical Division of Deere & Co., Tulsa, Okla. Dr. Garman, who holds a PhD in soil fertility from Cornell University revised the second edition of the textbook, "Using and Managing Soils" by the late A. F. Gustafson, Cornell University.

William Garman

Prior to his appointment by Grand River, Dr. Garman was assistant professor of soils, at the Agricultural Experiment Station and Agricultural Extension Service, Cornell University, Ithaca, N. Y.

•

Gen. Aniline Appoints Colman

S. Stephen Colman has been named general purchasing agent of the dyestuff and chemical division of General Aniline & Film Corp., New York. Mr. Colman, a resident of Plainfield, N.J., was associated previously with the Sherwood Refining Co. and the Celanese Corporation of America.

•

Pesticide Prod. in Japan

Although Japan has become largely self-sufficient in the production of standard pesticides, it is still dependent on imports for newer chemicals and improved products, according to reports published recently by the Japan Agricultural Pesticides Industry Association and the Japanese Ministry of Agriculture and Forestry.

The reports disclose that many pest-control products formerly imported, now are produced locally in quantities sufficient to meet all domestic requirements. Some of these products are sulfur, lime, arsenic, chlorine, and pyrethrum. For newer pesticides Japan will remain dependent on imports until basic research in that country is improved.

Chemafety Discussed

Mimeographed copies of "Industrial Aspects of Hazardous Pesticides," a talk delivered by Leo R. Gardner, California Spray Chemical Co., Richmond, Dec. 28, at the Pesticide Safety Seminar of the American Association for the Advancement of Science, Berkeley, Calif., are now available. The paper comments on particular safety problems involved in the use and handling of pesticides in manufacturing plants, in farms and in home garden usage, and touches on general safety rules which appear to the author to merit increased publicity.

Mr. Gardner finds that as far as the manufacturing and formulating end of the business is concerned, the greatest need for increased safety awareness exists among the small formulating companies, approximately 500 of which are one or two man enterprises. Since these men do not have the safety facilities that the larger companies have, the author recommends a stepped up safety campaign to insure greater awareness of the hazards involved in chemical formulating, and in knowledge of precautions that must be taken.

Discussing farms, the author finds the greatest danger where migrant laborers handle and work with hazardous chemicals without knowing English or being able to read. Mr. Gardner praises the various educational programs for help to alleviate this situation.

He summarizes the fundamental safety rules as follows: 1. Read labels and cautions before use. 2. Always keep pesticides in their original, properly labeled containers. 3. Protect pesticides by locking the storage room and keeping them out of reach of children and irresponsible persons. 4. Dispose of the empty container safely.

For detailed clinical memoranda on pesticides, Mr. Gardner suggests that readers obtain "Clinical Memoranda on Economic Poisons," by writing to Communicable Disease Center, U.S. Public Health Service, P.O. Box 769, Savannah, Ga.

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Amer. Chem. Society to Meet

The Agricultural and Food Chemistry Section of the ACS will meet March 30, when the American Chemical Society convenes for its 127th annual meeting at Cincinnati.

Papers to be presented at the meetings of the pesticide subdivision, March 31-April 2, include "O,O-Dialkyl S-(Alkylmercaptomethyl) Diethiophosphates as Systemic Insecticides," Elton L. Clark, G. A. Johnson, and E. L. Mattson, "The Toxicity of Endrin," Joseph F. Treon, Frank P. Cleveland, and John Cappel; and "Protection of Stored Grain with Pyrethrins-Piperonyl Butoxide Emulsion Sprays," W. E. Dove and H. O. Schroeder.

Chairmen at the three meetings of the pesticide group will be L. W. Hazleton, F. A. Gunther, and Wendell F. Phillips.

•

Pacific Borax Names Dosch

Pacific Coast Borax Co.'s Agricultural Sales Division announced recently the appointment of F. M. Dosch as the district manager of its district office in Kansas City. Mr. Dosch has been associated with the Pacific Coast Borax Co., since 1950 and has been stationed at field offices in Sioux City, Amarillo and Kansas City.

•

Discuss Cost of Weed Damage

A round table discussion of "What Do Weeds Cost" highlighted the seventh annual California Weed Conference held recently at Santa Barbara, Calif. Moderator of the panel was V. I. Cheadle, University of Calif., assisted by Paul Baranek, farm adviser, Madera County; Walter S. Ball, Dept. of Agriculture, Sacramento; Jack Major, University of California; and Dr. Norris Jones, State Personnel Board, Sacramento.

Hidden costs involved in weed control were discussed by Walter S. Ball. He mentioned costs of interstate inspection, pest quarantines and surveys, and maintance of the Los Angeles seed testing laboratory.

The subject was summarized by Luther G. Jones, who analyzed weed costs from the view of increased labor requirements, spray materials, higher processing charges and down grading. With 7,000,000 acres of irrigated crops grown in the state, the annual cost of weed control in California is $105,420,000, according to Mr. Jones' report.

1955 officers elected at the meeting were Paul Dresher, president; James Koehler, vice president; Oliver A. Leonard, secretary and Vernon L. Hall, treasurer. Lester J. Berry, University of California, is the retiring president.

3 States Khapra Quarantined

Arizona, California and New Mexico were placed under a Khapra Beetle quarantine February 21st by the USDA. Grain products and other materials likely to harbor the beetle while moving interstate from infested premises will require certification based on fumigation.

The Chief of the Plant Pest Control Board of Agricultural Research Service is authorized to determine the warehouses, mills and other premises on which infestation exists.

Two New Standard Oil Films

Standard Oil Co. (Ind.) has announced the availability of two color sound films dealing with materials and methods for combatting two deadly elm diseases now prevailing over wide areas in the middle west and elsewhere. "The Fight To Control Dutch Elm Disease" is the title of one 20-minute film produced by Standard's horticulturist with cooperation from the Illinois Natural History Survey and Michigan State College. The other is a 5-minute film on "Combatting Elm Phloem Necrosis." Symptoms of the two diseases are illustrated, habits of their known insect carriers explained and known control measures demonstrated. Films are available for showing to public groups through Standard's sales division managers, it was announced.

•

Conn. Vegetable Growers Meet

More than 250 vegetable growers from all parts of Connecticut attended the mid-winter vegetable meeting, held February 8th, at the Connecticut Agricultural Experiment Station and arranged by the New Haven County Extension Service. The group was welcomed by Dr. James G. Horsfall, director of the experiment station. New advances in control of diseases and insect pests of vegetables were described by Saul Rich, plant pathologist, and James B. Kring, entomologist.

•

Jenkins Appointed

Virginia-Carolina Chemical Corp., Richmond, Va., recently reported the appointment of R. Andrew Jenkins as assistant manager of the Baltimore sales office. Jenkins was previously assistant manager of the Norfolk headquarters of the company.

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New NH_3 Plant Appointments

Executives who will take over at Ketona Chemical Corporation's anhydrous ammonia plant near Birmingham, Ala., upon its completion toward the end of this year were named in a recent announcement by P. H. Neal, Ketona's president. Ketona is an Alabama subsidiary of Alabama By-Products Corp. and Hercules Powder Co., Wilmington, Del. The appointments are: Dana F. Sprague, works manager; Henry J. Weiland, assistant works manager; Donald G. Sentman, office manager and chief accountant; and Hursel L. Browning, works engineer.

Mr. Sprague has been with Ketona since 1940. Mr. Weiland has been special research engineer at Alabama By-Products Corp. for its coke oven gas anhydrous ammonia project. Previously he had served with Lion Oil Co., El Dorado, Ark.

Witco Acquires Emulsol

Full ownership of the chemical division of the Emulsol Corp., Chicago, was acquired recently by Witco Chemical Co., New York. Under Witco's management the division will be known as the Emulsol Chemical Corp. A Witco spokesman has announced that Benjamin R. Harris will continue as president, and that no policy changes or major personnel changes are contemplated. Solomon Epstein, who has been with Emulsol for many years, will take over as executive vice president.

Charge Dumping of Red Potash Continues

THE controversy between American potash producers and importers of East German products was aired before the United States Tariff Commission at public hearings held recently in Washington, D.C. Representatives of American manufacturers repeated the Treasury Department's charge that importers of potash into the United States from the Communist-controlled areas of Germany have disrupted prices and are threatening injury to domestic producers. The importers replied that they have merely sought to maintain their position in the U.S. market and denied any evidence of injury to the domestic industry.

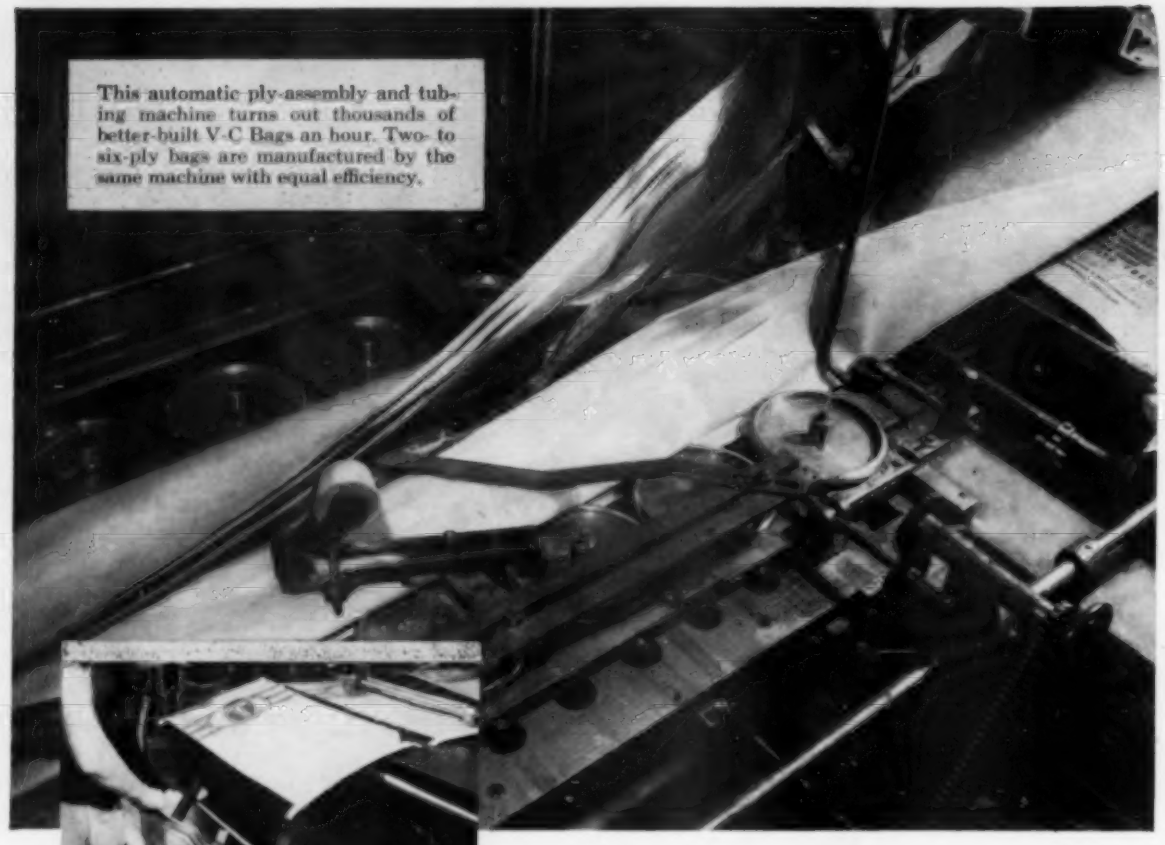
The defense argued further that the anti-dumping act was established only to prevent "destruction of an industry." In other words, the sale of potash at less than fair value would not in itself constitute a violation of the anti-dumping act.

Counsel for the American firms disputed the latter contention and attempted to indicate statistically the extent of the damage already done to the American manufacturers and the more considerable injury anticipated. A. Norman Into, vice-president of International Minerals & Chemical Corp., said that customers of IMC have raised questions about the company's future prices in relation to the price of the Communist produced product. He submitted an extensive report on conversations between customers and IMC salesmen wherein the customers emphasized that they would have to give serious consideration to purchasing the East German material because of the wide price differential. He maintained that the threat of a large tonnage of German imports in 1953 failed to materialize only because of the Congressional hearings that year and the commencement of the current investigation.

Willard R. Ashburn, counsel for Smith Douglass Co., Inc., Norfolk, Va., and appearing on the side of the importers, drew an admission from Mr. Into to the effect that IMC, which is a formulator as well as producer of fertilizers, had been a purchaser of East German potash. However, Mr. Into denied the implication that IMC had purchased the East German potash to use in its own fertilizer mix while selling the higher-priced domestic potash to its mixer customers. He said that the imports of East German potash were to meet contracts for potash which IMC had been unable to fill from its domestic production.

Other witnesses appearing on behalf of the American potash industry were Paul Speer, vice-president and general counsel of United States Potash Co., New York; F. O. Davis, Potash Co. of America, Washington, D.C.; and Thomas W. Childs, Southwest Potash Corporation, New York.

The Tariff Commission will announce its decision later.



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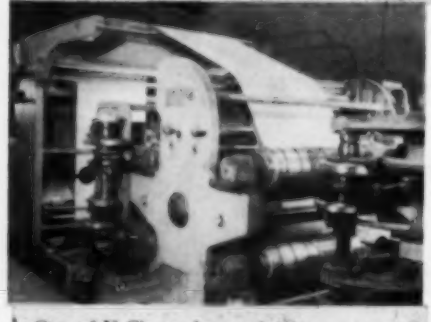
After ply-assembly, tubing and cutting, comes top and bottom sewing. Operator above is inspecting finished sewn-bags as they come from sewing machine.



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Nelson New Sec. of ESA

Robert H. Nelson was recently appointed executive secretary of the Entomological Society of America, succeeding Dr. A. B. Gurney, who resigned at the end of 1954 to return to duties at the USDA. Mr. Nelson was expected to assume his new position the first week in March.

Mr. Nelson had been with the USDA since 1946. He was recently in charge of coordinating the screening work in the Entomology research branch, USDA.

•

PennSalt Pres. to Retire

George B. Beitzel, president of the Pennsylvania Salt Manufacturing Co., Philadelphia, announced February 24th plans to retire later this year, when he completes 25 years' service with the company. He recommended that William P. Drake be appointed vice president, and elected to board membership. Both recommendations were approved.

•

Montrose Offers DDVP

Montrose Chemical Co., Newark, N. J., is now producing dimethyl-dichloro vinyl phosphate (DDVP) on a pilot plant scale and offering it for experimental purposes to properly qualified organizations.

DDVP, which has not yet been approved for commercial use, was recently described by Oveta Culp Hobby, secretary of health, education and welfare, as a new and promising insecticide. It was discovered by Dr. George W. Pearce, chief of the chemical section of the Savannah, Ga. Communicable Disease Center.

•

Raymond Names Sparkman

Raymond Bag Co., Middletown, O., announced recently the appointment of Ward F. Sparkman as the southeastern district representative. Mr. Sparkman will direct sales in the states of Alabama, Georgia, Florida and Tennessee.

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IMCC Ups K_2SO_4 Output

International Minerals & Chemical Corporation is expanding its potassium sulfate producing facilities at Carlsbad, New Mexico. This latest increase in production will boost output of potassium sulfate by 40,000 tons per year to 150,000 tons annually. Construction has already started, and increased capacity will be available by June 1.

•

New Facilities at Oldbury

Facilities for production of phosphorus pentasulphide are expected to be completed sometime this month at the Olbury Mississippi Works of Oldbury Electro-Chemical Co. The product will be manufactured in both solid and ground formulations.

Chafer Quarantine Proposed

Public hearings on a proposal to quarantine the states of Connecticut, New York, and West Virginia because of the occurrence there of the European Chafer, a June beetle, were scheduled to be held in Pittsburgh, March 10.

The U.S.D.A. reports that the hearings were arranged because, during the last few years the Chafer has been spreading dangerously. The zone of infestation now includes an area of about 600 square miles.

DuPont Names Turf Specialist

The job of turf specialist, for handling development and service work on turf applications of pest control products and soluble plant food, has been established by E. I. du Pont de Nemours & Co., Wilmington, Del. A duPont spokesman explained that the new position was created because of the increasing importance of chemicals in turf improvement. Robert T. Miller, North Wales, Pa., has been named to take over the job. He will headquarter at the Philadelphia office of Du Pont's Grasselli Chemicals Department.

•

Gilman Names Wellington

H. D. Wellington, formerly of Bagpak Division, International Paper Co., has been appointed western sales manager of the Gilman Paper Co. and subsidiaries, with offices at Chicago. Mr. Wellington's experience with International Paper covers fourteen years. His last position was middle west sales representative.

Potent Insecticide Claimed

An insecticide claimed to be more effective than DDT and other chemicals, was announced last month by the U.S. Public Health Service. Known as DDVP (dimethyl dichloro vinyl phosphate) the substance was developed by Dr. George W. Pearce, chief of the chemistry section of the Public Health Service laboratory at Savannah, Ga., and chemists Arnold M. Mattson and Jane T. Spillane.

The Department of Welfare reported that when DDVP was tested recently in a large dairy barn where there was a high fly population with a known immunity to DDT, most of the flies were eliminated within four hours by eight grams of the new chemical.

•

Olin-Mathieson Grant

The Olin Mathieson Chemical Corp., Baltimore, has announced a grant of $5,000 to the University of Arkansas Agricultural Experiment Station to undertake a study of the ammonium phosphate types of fertilizers during the 1955 calendar year. Laboratory, greenhouse and field experiments relating to availability for plant growth of the different sources of phosphorus, particularly phosphate fertilizers containing ammonium in comparison with superphosphate, will be made. Drs. E. O. McLean and C. L. Garey of the university's agronomy staff will conduct the studies.

•

Air Pollution Symposium

A program consisting mainly of 23 technical papers has been arranged for the third National Air Pollution Symposium to be held April 18-20 at the Huntington-Sheraton Hotel, Pasadena, Calif. Topics will include general aspects of air pollution, analytical techniques in dealing with it, effects on plants, effects on animals and legal aspects.

General chairman of the symposium is Dr. A. M. Zarem, assistant director in charge of Stanford Research Institute's Los Angeles division. Headquarters of the symposium are at the institute's offices in Los Angeles.

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Keeping fertilizers "On the run"

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The ability of Celite Fillers to keep a product free-flowing results from their high absorption properties and unique diatom structure—properties which make them unusually effective safeguards against caking in deliquescent materials. They are two of the unusual physical characteristics that adapt these diatomaceous silica powders to numerous industrial uses.

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- More Durable Finish
- Increased Viscosity
- Elimination of Caking
- Higher Melting Point
- Better Dry Mixing
- Improved Dispersion

Johns-Manville CELITE®

MINERAL FILLERS

New York Garden Show Features Aerosols

NEARLY 250 garden supply manufacturers participated in the twelfth National Garden Supply Trade Show, held Feb. 1-3 at the 69th and 71st Infantry Regiment Armories in New York City, to feature new . . . and old products for the home garden market. Although no radically new product was presented, there were enough modifications and improvements in application equipment and enough variations in insecticide and fertilizer formulations to stimulate considerable interest in the displays and booths. As usual, the show was directed to members of the garden supply industry and representatives of the press.

In spite of bad weather, attendance was up to expectations, with three thousand spectators already registered before the end of the second day's activities. The *Garden Supply Merchandiser*, Baltimore, sponsor of the show, reports that in both attendance and number of products displayed, this was the largest garden supply trade show ever held.

A greater emphasis on aerosols and hose-attachment sprayers was one of the trends that stood out at this year's show. Many manufacturers were displaying aerosols for the first time; others, who had experimented with aerosols last year now featured them as a regular and extensive part of their line of merchandise. Aerosols figured prominently in displays of E. I. DuPont, Wilmington, Science Products Inc., Chicago; Boyle-Midway Co., New York, etc.

Arno H. Johnson, vice-president and director of research for J. Walter Thompson Co., New York, discussed the population shift from urban to suburban areas and the consequent growth of the home garden market in an address presented during the formal sessions of the 3-day show. He mentioned higher discretionary income as one factor contributing to home garden sales. In speaking of the 1955 business outlook, he predicted a "10 per cent increase in sale of consumer goods and services in 1955 and a third higher standard of living by 1960."

Dealers showed considerable interest in the morning round-table discussions that were held at the show. Subjects included promotion and advertising, business procedure and customer relations.

Some of the new products that attracted attention at the show were DuPont's aerosol herbicide, an aerosol "Blossom-Set" and several new types of hose-attachment sprayers.

The DuPont aerosol leaves a trace powder after application, so that the user can determine which weeds have been sprayed. A new aerosol spot weeder displayed by Bridgeport Brass Co., Bridgeport, Conn., featured a novelty applicator which eliminates the need to stoop while spraying.

Manufacturers of hose attachment sprayers had various solutions

(*Continued on Page* 119)

Geigy Opens Des Moines Plant

New automation equipment and dual production area of the $500,000 Des Moines agricultural chemical plant of Geigy Chemical Corp. was on display recently when the firm held its official opening.

The automation equipment occupies both wings of the 35,000 sq. ft. factory. One wing is devoted to insecticide formulations, the other to weed killers, and both wings are separated by a center section housing an office, control laboratory, employee shower and lunch room. Employees passing from one wing to the other are required to wash and change clothing to prevent contamination.

Recent developments of the firm's agricultural chemical division are Diazinon, Sequestrene, and Chlorobenzilate. All will be produced at the Des Moines plant, 3525 Vandalia Rd.

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McNew Addresses N. Y. ACS

"Agricultural Chemical research may be expected to increase 50 to 100 per cent in the next two decades," Dr. George L. McNew, Boyce Thompson Institute for Plant Research, Inc., told the New York Section of the American Chemical Society at its meeting in New York City, February 11th. Discussing how much farmers will pay for chemicals to prevent a loss of almost $4 billion (due to weeds, diseases, insects, etc.), Dr. McNew said that "judging from present practices, and the usual hesitancy of farmers to spend money before it is absolutely necessary, one could be assured of only a 10 to 15¢ investment for each dollar to be gained, or about $400 million.

In a discussion of herbicides, O. B. Hitchcock advised that good results are being obtained with alpha naphtyl acetic acid, and of course 2,4-D for vine-type weeds. He reported that several new experimental compounds show promise for herbicidal use, of which disodium methyl arsenate warrants special consideration. He mentioned too that several of the experimental herbicidally active chemicals contain "chlor" substitutions. Dr. Hitchcock reported also on the use of 2,2 dichloro propionic acid, and diethyl chloroacetic acid.

Dr. A. J. Vlitos outlined the action of hormones in preventing or stimulating flowering and suggested the possibility of use of the hormones, such as endo acetic acid, and its "anti" compound in the control of plant growth.

A bioassay method of determining residues on food products was outlined in a report by Dr. Birchfield, while Drs. S. E. A. McCallan and J. Miller traced the mechanism of action of fungicides.

New Nopco Field Sales Mgr.

Nopco Chemical Co., recently announced the appointment of Robert T. Whelan as a field sales manager for the agricultural department.

•

Bemis Advances LeRoy

R. B. LeRoy, sales manager of the East Pepperell, Mass., multiwall paper bag plant of Bemis Bro. Bag Co., has been placed in charge of newly established Bemis facilities in Minneapolis.

SYSTOX*

now nationally accepted for control of aphids and mites on

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APPLES
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Pesticide Research Findings Reported at Western Co-operative Spray Project

RESEARCH entomologists and plant pathologists representing state, federal and provincial research agencies met in Portland, Oregon, at the Imperial Hotel January 18, 19, 20 for their 29th annual meeting. Dr. L. C. Gentner, project chairman, welcomed industry representatives to the "open" meeting January 20th, and introduced section leaders who summarized regional research activities during the past year.

Stone Fruit Pests

LAST year 8 per cent of Oregon's cherry growers used dusts to control black cherry aphis. Field tests indicated a four per cent malathion dust gave better control in the popcorn stage than in petal fall. Results with both sprays and dusts of malathion were similar. Demeton emulsifiable, applied as a trunk paint, was effective in controlling the aphis. In southern Oregon, malathion was effective against black cherry aphis, but combinations of malathion, DDT and wettable sulfur failed to give control, and resulted in aphid injury. In Colorado, workers found timing of fall control applications of extreme importance; sprays applied one day too late resulted in poor aphis control. Leaf curl was a problem in California. Dormant, delayed dormant, and cluster-bud applications of insecticides gave good control, but petal-fall applications were ineffective. Washington areas experienced an early invasion of aphis, and leaves were curled badly. Dormant applications gave little protection, as aphis apparently moved in from other hosts. Control with malathion or parathion has been good.

Peach silver mite and cherry rust mite were a serious problem in Utah. The rust mite stopped fruit development and caused injury. Peach silver mite was also plentiful in Washington, where applications of chlorothion or Systox gave adequate control. Few Pandemus moths were taken in traps. Effectiveness of recommended control materials against Oriental fruit moth was tested in the field. The recommended program of DDT plus malathion was adequate. Two invasions of leafhoppers prompted researchers to attempt control of leafhoppers and fruitflies with a single application of insecticide. A four per cent malathion dust, substituted for the lead arsenate used usually, gave a 100 per cent kill in 24 hours. Malathion or parathion in the emulsifiable concentrate form as a spray was also good; diazinon was slightly less effective. Montana surveys showed fruit flies present in all cherry orchards checked. Good control of cherry fruit fly with Perthane was reported from Oregon. Parathion, malathion and diazinon were also effective. Perthane sprays or dusts outlasted both malathion and diazinon applied to foliage, and then exposed to continuous rain in the field. No treatments were effective after 13 days.

Experimental use of soil insecticides to control cherry fruit fly larvae in the ground showed several materials which gave effective kills, but at such high rates that such control would not be economically feasible.

Apples and Pears

CODLING moth resistance to DDT was not clearly proved in the Northwest, although there is an area of suspected resistance near Yakima, Washington. Codling moth larvae from these orchards have been exposed to DDT in the laboratory, and have shown a slightly increased resistance to DDT. In Colorado, control of codling moth with DDT was quite difficult in commercial orchards, and "problem" orchards averaged 30 per cent worms. In experimental plots, DDT, malathion, parathion and diazinon all gave excellent control of codling moth. Use of surfactants with DDT in British Columbia gave better control on codling moth than with applications of DDT alone. DDT, ryania and diazinon were tested on codling moth in Yakima, and worked well.

Phosphate-resistant mites were quite evident in several areas—to parathion, and other phosphates—including some of the systemics and certain of the new experimental formulations. There is still some confusion regarding the identity of certain spider mites. In British Columbia, the European red mite is most plentiful. Parathion and malathion have been used on the three mite species found there. Aramite and Ovotran have been effective against parathion-resistant mites. Wenatchee growers did not have too much difficulty with mites this past season, but did find some resistance to parathion. In the Yakima area, diazinon and pirazinon were both effective on mites. Diazinon was the only phosphate which was able to control parathion-resistant mites in the Hood River, Oregon area. Four applications gave good control. Karathane also gave mite control, but some injury. Medford, Oregon, workers also noted resistance of two-spotted mites to parathion. None of the phosphates they tried were effective, but non-phosphate acaracides gave control. Genite 923 and Mitox were the only materials useful against European red mite in California field trials during delayed dormant and cluster bud stages. Systox and OMPA were effective as post-bloom applications.

Wooly apple aphis was not a problem in the Northwest this past season. On pear psylla, phosphates did an outstanding job of control. In Yakima, diazinon and other phosphates were effective. At Medford, delayed dormant lime-sulfur and oil gave control. No additional treatments were needed for pear psylla until the first cover.

San José scale was controlled in Yakima by applications of parathion 14 days after bloom. Systemics applied in early sprays gave better results than when they were applied later.

Systox at one quart was inadequate on pear leaf blister mite. Cali-

fornia workers used all materials recommended for this pest; lime sulfur and oil, and lime-sulfur and wettable sulfur combinations were best.

Plant Diseases

STREPTOMYCIN sprays were used for control of fire-blight on pears in California and proved effective, but dust applications of the same material did not bring desired results. Streptomycin sprays will probably be used in commercial orchards in those counties where it was field tested, but cost will limit general usage (about $60.00 per acre per season). Hood River researchers tested five formulations of streptomycin on pears, found all to be about equal in effectiveness. On Bartletts, 30 ppm applied five times at seven-day intervals, equalled control of seven applications of tribasic copper sulfate at one pound per 100 gal spray. Concentrations in the range of 60-100 ppm were best. Three applications at 100 ppm at 14-day intervals equalled five applications of a 30 ppm concentration. Copper injury in the field was apparent on Bartletts. Streptomycin caused severe chlorosis on young pear leaves, but had no apparent adverse effect on fruit or yields.

Apple and pear mildew were severe in the Hood River section. Karathane applied to D'Anjou caused leaf injury, but no injury was noted on other pear varieties. Karathane reduced damage from pear mildew and is suggested for use on other varieties where it causes no injury.

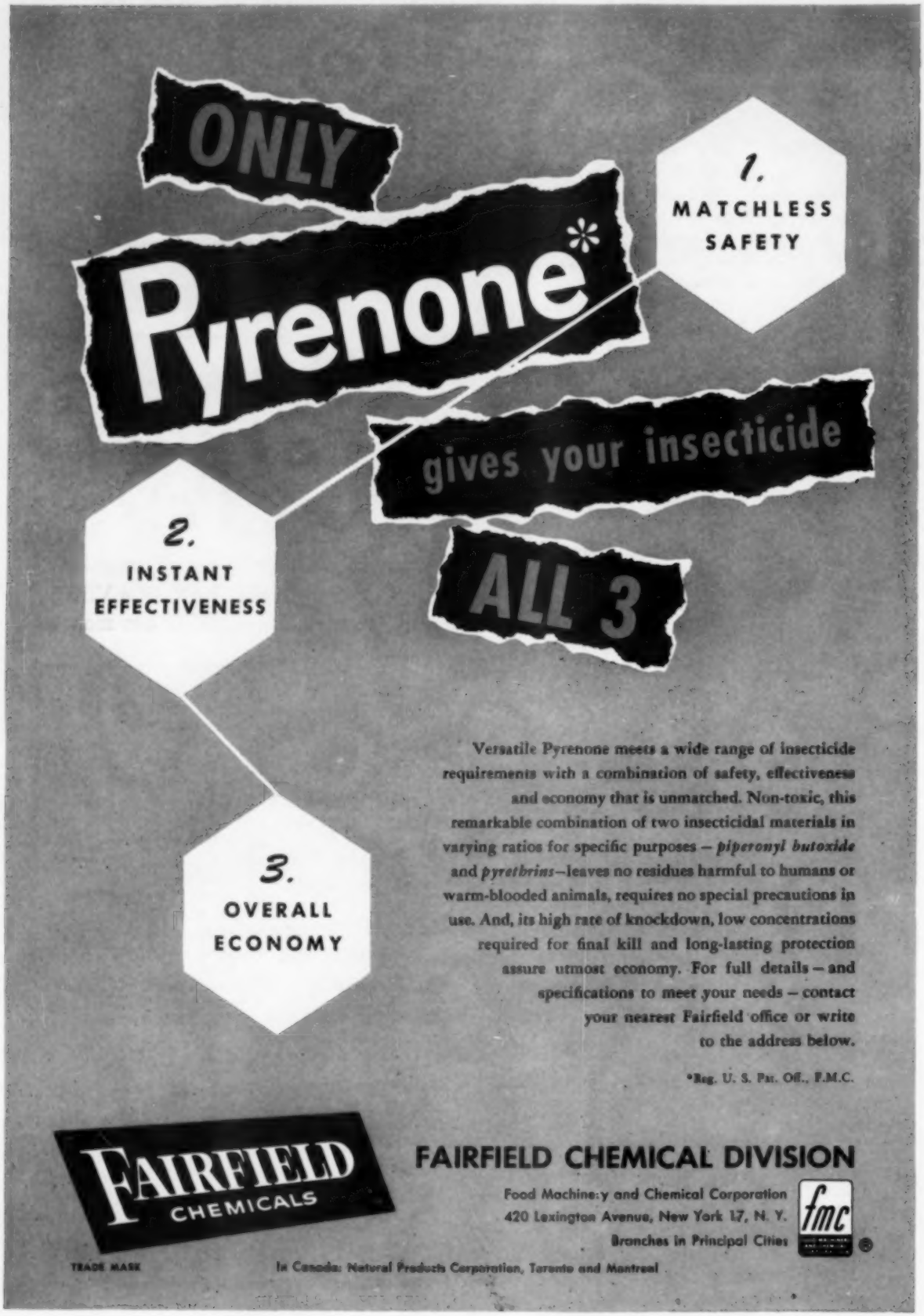
Ziram is suggested in early or late sprays for control of Bull's eye fruit rot on apples. Results from dust applications of ziram during late season have been quite gratifying. This rot shows up on fruit only after it is in storage. Captan was poor against apple scab in Hood River, and very injurious to pears.

Pesticide Hazards

EXPERIENCE in the field during the past season has reemphasized the importance of artificial respiration in the treatment of serious cases of poisoning by organic phosphorus insecticides. Several individuals poisoned by these materials have been saved by artificial respiration from what would otherwise have been inevitable death. When breathing of exposed victims becomes difficult, oxygen should be supplied. In the hospital, or even in the ambulance, equipment for artificial respiration should be ready for *immediate* use, and the patient watched carefully, for respiratory failure may occur suddenly and with little warning.

Northwest field experience has shown that skin absorption of parathion spray is even more important than respiratory exposure. The use of gloves and other protective clothing by spraymen should be emphasized. In addition to protective clothing, respirators are recommended for those exposed to dusts.

Growers should be cautioned to keep workmen out of the orchard for as long as possible, following applications of organic phosphates. Several cases of poisoning by parathion occurred this past season in which ex-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Versatile Pyrenone meets a wide range of insecticide requirements with a combination of safety, effectiveness and economy that is unmatched. Non-toxic, this remarkable combination of two insecticidal materials in varying ratios for specific purposes – piperonyl butoxide and pyrethrins–leaves no residues harmful to humans or warm-blooded animals, requires no special precautions in use. And, its high rate of knockdown, low concentrations required for final kill and long-lasting protection assure utmost economy. For full details – and specifications to meet your needs – contact your nearest Fairfield office or write to the address below.
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FAIRFIELD CHEMICALS
TRADE MARK
FAIRFIELD CHEMICAL DIVISION
Food Machinery and Chemical Corporation
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fmc
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posure was apparently obtained while thinning fruit shortly after it was sprayed with parathion.

Additional cases of poisoning by handling empty containers of organic phosphorus compounds indicate the need to again call attention to the importance of proper destruction of used containers. Several reported illnesses from exposure to demeton indicate that this material must be handled with the same precautions as those recommended for parathion or TEPP.

Officers elected for the 1956 meetings were: chairman, Roderick Sprague, Tree Fruit Experiment Station, Wenatchee, Wis.; co-chairman, L. C. Terriere, Oregon State College, Corvallis, Ore.; and secretary, Harry Andison, Canadian Dept. of Agriculture, Victoria, B.C. The 1956 meeting will be held January 18, 19, 20 at the Imperial Hotel, Portland, Oregon.

Mr. O. B. Hitchcock, Chemagro Corp. and Industry Chairman, expressed his appreciation to the research workers for their promptness in sending in summaries of their work to be published in the printed abstracts of research. There are a limited number of these printed abstracts from the Spray Project available from Mr. C. O. Barnard, secretary-treasurer, Western Agricultural Chemicals Assn., 2466 Kenwood Ave., San Jose 26, Calif.

•

Campaign Against Khapra Pest

The U. S. Department of Agricultural is conducting a campaign to eliminate the Khapra beetle (*Trogoderma granarium*) a grain pest that recently turned up in California and Arizona. In a pamphlet entitled "Have You Seen This in Your Grain" the department describes the beetle, the type of damage and best methods of spotting the insect.

The pamphlet advises farmers how to hand-sift grain, check bag corners, examine grain bins and to take samples of sweepings. When the beetle is present, fuzzy larvae or cast skins usually remain after the grain is sifted. The pamphlet contains large photographs of the larvae with a request to farmers to send in any specimans resembling the photographs.

This marks the initial appearance of the Khapra beetle in this country. A spokesman for the U. S. Dept. of Agriculture has warned that the insect spreads very rapidly and may reach other grain producing areas unless farmers and the USDA cooperate to check its spread.

A native of Ceylon, India and Malaya, the beetle came to this country after appearing in Europe and Africa.

Brea Names Bergsteinsson

Dr. I. Bergsteinsson has been appointed senior market research and development engineer for Brea Chemicals, Inc., Brea, Calif. subsidiary of the Union Oil Co.

Formerly senior research chemist for the Union Oil Co., Dr. Bergsteinsson will specialize in studies of West Coast markets for Brea's industrial products, which now include aqua and anhydrous ammonia, dry ice, liquid CO_2, ethyl and methyl mercaptans, and sulfur.

DIAMOND insecticides and herbicides are known for dependable potency

We make sure of it here

Diamond's research and development center in Painesville, Ohio

So you can count on peak performance here

Write for literature on any of our products, and feel free to consult our technical staff when you have special problems. Your inquiries are welcome. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

DIAMOND ALKALI CHEMICALS

Diamond Chemicals

DIAMOND AGRICULTURAL CHEMICALS

- DDT
- BHC
- LINDANE
- MITICIDE K-101 (Ovex)
- Seed Disinfectant
- 2,4-D Weed Killers
- 2,4,5-T Brush Killers
- Grain Fumigants
- Wettable powders, emulsifiable and oil solutions; and dust concentrates based on our technical grade chemicals

and many other chemicals that help farmers, gardeners, cattlemen and orchardists.

Southern Workers Discuss Mb.

Traces of molybdenum can be the difference between lush pastures and fields with stunted growths of alfalfa, clover and other legume crops, Dr. Charles H. Kline of Climax Molybdenum Co., New York, told a meeting of the Southern Agricultural Workers at the Brown Hotel, Louisville, Ky., February 7th. Legumes, he explained, require traces of molybdenum to "fix nitrogen"—i.e., take nitrogen from the atmosphere and convert it into plant protein.

Without molybdenum, legume stands are difficult to establish and do not persist. Legume-grass pastures are poor and their protein content is low. Treating deficient soils with molybdenum, he reported, has raised pasture and legume hay yields as much as 500%, making pasture improvement programs economically feasible in some areas for the first time.

Molybdenum chemicals are applied in mixtures with fertilizers, in field sprays (alone or with other agricultural chemicals), or as seed treatments, the molybdenum expert explained. Tentative recommended rates for pastures are 2 ounces of molybdic oxide or 2-½ ounces of sodium molybdate an acre, applied once every four to five years.

•

Offers DDT "Krisp Chips"

Montrose Chemical Corp. of California, Los Angeles, offers in commercial quantities a new physical form of DDT known as "Krisp Chips." Described as between the lump and flake DDT in form, DDT "Krisp Chips" are recommended for either dust or liquid solutions.

R. W. Greeff & Co., New York, is the eastern selling agent; while Stauffer Chemical Co., San Francisco, will handle west coast sales.

•

CFA Offers Film

"California Grows with Fertilizer," a new 16 mm. color film has been made available for exhibition by the California Fertilizer Association, San Marino, Calif. The film is a non-technical one, produced for the general public. It describes the production of commercial fertilizer from raw material to its final form.

•

Zonolite Fellowship

The Zonolite Co., Chicago, announced recently that it has established a graduate fellowship at Clemson College, Clemson, S. C., for vermiculite research. Irving F. Havens, Jr., Belfast, N. Y., was named the first winner of the fellowship which covers one year and is worth $1,500.

Sponsor Essay Competition

"Gaining Ground With Fertility" is the subject of a conservation essay contest sponsored jointly by the National Grange, Washington, D.C., and the American Plant Food Council, Washington, D.C. The contest, open to all young men and women under the age of 21, offers $5,000 in cash prizes for the best 800 words or less dealing with building and maintaining soil fertility. Deadline is March 31, 1955.

SPOTLIGHTING PENCO®

HIGH GAMMA BHC Technical

PENCO High Gamma BHC Technical—averaging 46% gamma isomer—from Penn Salt's Calvert City, Kentucky, plant, has these advantages!

- More versatile and economical to process by dissolving, impregnating and grinding.
- More highly concentrated dust bases, wettable powders and liquids can be produced.
- Less material to store, handle and process.
- Higher quality cotton dust can be formulated for application by air or ground equipment.

PENCO BHC Technical—averaging 14% isomer—available in flake form—ideal for easy grinding—extending into dust bases—finished dusts.

For superior, high-quality products
select PENCO Agricultural Chemicals.

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Bryan, Texas; Montgomery, Ala.; Aurora, Ill.

Pennsalt Chemicals

European Dithane Conference

By P. Boller, Germany

OVER 40 plant disease specialists of Dithane distributors from 12 European countries took part in a technical conference held in Zurich on the 3rd and 4th February, 1955. F. W. Tetzlaff, managing director of Minoc, Paris, a subsidiary company of Rohm & Haas of Philadelphia was chairman.

In many countries, dithane is giving substantial increases in yields and it was emphasized by several delegates that the criterion for a product used on potatoes is not the degree of disease control obtained, but the amount of healthy tubers harvested per acre. For the control of scab of apples and pears Dithane has given outstanding results particularly in Switzerland since 1948. During all these years Dithane has proved its capabilities of giving a finish to the fruit similar to Captan, and recent trials have shown that Dithane treated fruit has exceptional storage qualities.

Dithane is of greatest importance in the large wine growing areas of Europe. It is very effective against vine peronospora and gives excellent growth stimulating effect at the same time. In France, Switzerland and Italy Dithane/copper mixtures are used extensively by vine growers with excellent results. It has been proved by various research workers that a synergism exists between Dithane and copper which makes the mixture 2 to 2½ times more effective than the components taken independently. This means that minimum amounts of active material are required in the mixture to protect the vines from peronospora, eliminating any risk of copper phytotoxicity. The mixture will also give fair protection against vine oidium.

Dithane has a specific efficacy against rust diseases and has been successfully used against rust of plumes and ornamentals. Finally, it has its particular applications for the control of diseases of vegetables, and is practically non-toxic to mammals.

Reports from all countries represented pointed unanimously to the unique potentialities of this fungicide for a variety of crops.

At the end of the conference a dinner was given by the Minoc people and each delegate presented with an attractive souvenir ash tray.

CCDA Award to Atlas VP

The 1955 honor award of the Commercial Chemical Development Association was presented recently to Kenneth R. Brown, vice-president of Atlas Powder Co., Wilmington, Del. Nolan B. Sommer, president of the CCDA, said Mr. Brown was selected for the honor in recognition of his work in development and marketing of sorbitol and related products.

Brea Nitrate Plant

Construction was started early last month on an ammonium nitrate plant to be operated by Brea Chemcals. Inc., Brea, Calif., subsidiary of the Union Oil Co. of California.

The new plant will be located next to the Brea ammonia plant, and will produce approximately 50,000 tons per year of fertilizer grade ammonium nitrate. Completion is scheduled for mid-summer, 1955.

The new plant will be owned by Amoniaco Corp. and leased to Brea Chemicals, Inc., for operation. Contractors for the new plant are the Chemical & Industrial Corp., Cincinnati, O., which will supply the process units.

•

Copper Situation to Improve

High prices and scarcity of copper are expected to ease up in the second quarter of this year as a result of settlement of strikes at the four big copper mines in Northern Rhodesia, Africa. Production there has already climbed to 60 per cent of normal with workers returning to the job at a rate of 700 or more a day. Since it takes about 90 days of processing before copper is marketable, settlement of the strikes will not mean an immediate improvement in supply.

The U. S. Government has taken definite steps to protect the American supply during this period by banning all exports of domestic refined copper for February and March and limiting scrap copper exports to 12,000 tons.

•

N. C. ESA Meets March 24, 25

The North Central Branch of the Entomological Society of America will hold its tenth annual meeting March 24-25 in East Lansing, Michigan. Dr. T. C. Allen of the University of Wisconsin and chairman of the branch announces that the theme of the meeting will be "Today and the Next Ten Years in Entomology."

Individual reports will be made on new chemicals, legislation, and other insect control questions. Speakers for the general opening session will include Harold Gunderson and Floyd Andre of Iowa State College, C. C. Alexander of the Geigy Company, A. C. Hodson of the University of Minnesota, W. W. Sunderland of Dow Chemical Co., and Roger Smith of Kansas State College.

In addition to the general program, several information section meetings will be offered. Cereal, legume, fruit, vegetable, and forest crops will receive attention. Insecticide effectiveness, biological relationships, and relationships between insects and man are scheduled for discussion.

Prentiss' Canadian Distributor

Prentiss Drug & Chemical Co. New York, has appointed Frank E. Dempsey & Co. as Canadian distributor for its complete line of insecticides, rodenticides, and botanicals. Head office of the Dempsey company is located at 133 Douglas Drive, Toronto 5, Ontario, and a branch is maintained in Montreal. Mr. Dempsey was formerly sales manager of the chemicals department of Standard Chemical Co., Ltd., Montreal.

Add a selling feature to your insecticide with sift-proof

DUOTITE BAGS

You'll give your customers 100% value, your salesmen something to shout about when you pack your insecticide in Duotite bags. The exclusive Shellmar-Betner Duotite feature is a double-folded and heat-sealed bottom, which combined with liners, give positive assurance that your product won't sift. The top can be double-folded and heat-sealed, too; and there is reasonably-priced machinery available for this purpose. Add to sift-tightness the eye-appeal of clean, crisp color-printing by Shellmar-Betner craftsmen; and you have a package that will really build sales.

This is only one of many different packages that Shellmar-Betner now makes for chemical products. If you'd like better flexible packaging for your product, check with Shellmar-Betner.

SIFT-PROOF—
Specially lined and sealed. Duotite bags give double protection against sifting. Customers get full measure of quality.

CONTINENTAL CAN COMPANY

SHELLMAR-BETNER
FLEXIBLE PACKAGING DIVISION
MT. VERNON, OHIO

Sales Offices in Principal Cities

NEWS Brevities

ARTHUR M. KRAFT, creator of Spencer Chemical Company's "Mr. N" trade symbol for ammonium nitrate, has been named one of the "Ten Outstanding Young Men of the Nation." He is the first painter-sculptor ever to be selected for this honor.

* * *

H. CLAY HANSEN has been appointed agricultural specialist in the Arkansas Fertilizer District for Olin Mathieson Chemical Corp.

* * *

100 FLETCHER FU-24's, manufactured by Fletcher Aviation Corp., Rosemead, Calif., were purchased recently for crop dusting use in New Zealand by Cable-Price Co., Hamilton, New Zealand.

* * *

"PARASITE CONTROL IN LIVESTOCK," a Du Pont Co. film, was premiered at the Feb. 24th meeting of Livestock Conservation, Inc., in Chicago.

* * *

THOMAS J. COLDER has been named southeast sales representative for American Cyanamid Company's Manufacturers Chemicals Department, with headquarters in Atlanta, Ga.

* * *

EMULSOL CHEMICAL CORP., Chicago, recently appointed Arthur Raven to the position of assistant sales manager.

* * *

LAWRENCE R. GARDNER will take over as purchasing manager for Commercial Solvents Corp., with headquarters in New York.

* * *

ATLAS POWDER CO. has moved its general offices from the downtown Delaware Trust Building in Wilmington, Del., where it has been located for 34 years, to a newly constructed building on a 45 acre tract just outside of the city.

CONSTRUCTION of a $7,500,000 ammonia plant for Quebec Ammonia Co. will begin this spring at Contrecoeur, near Sorel, Que. It is expected to be in operation by mid-1956.

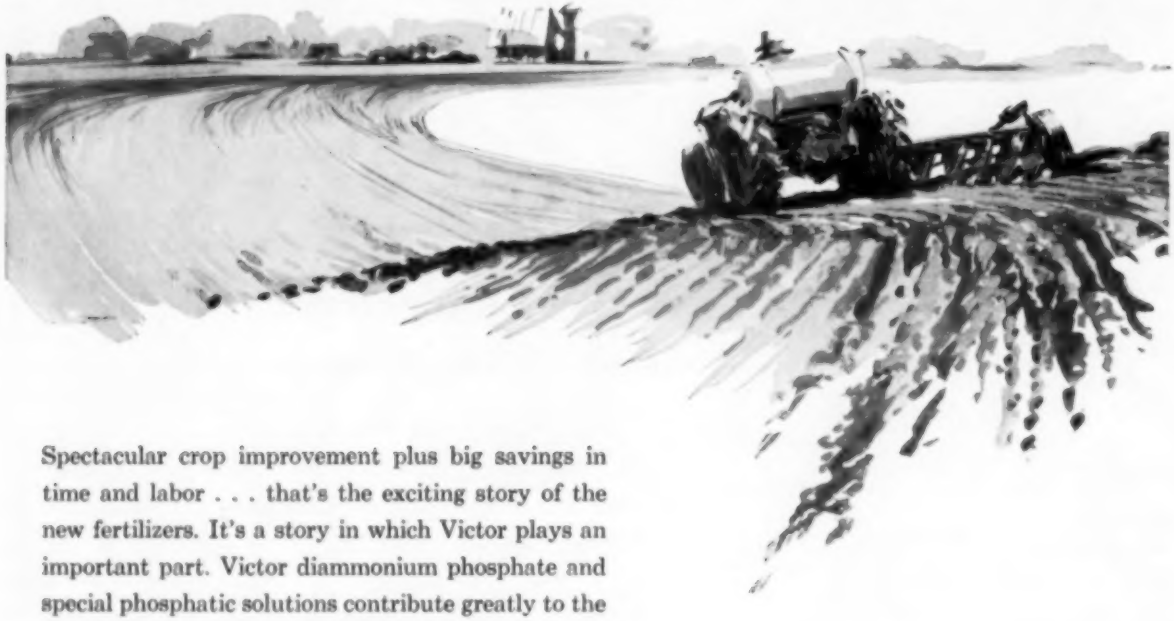
* * *

JAMES O. KING was promoted last month to the job of special staff assistant in the sales department of Diamond Alkali Co., Cleveland.

* * *

THE NATIONAL SAFETY COUNCIL has selected David L. Arm to serve as manager of its industrial department.

Victor Chemicals improve fertilizers...



Spectacular crop improvement plus big savings in time and labor . . . that's the exciting story of the new fertilizers. It's a story in which Victor plays an important part. Victor diammonium phosphate and special phosphatic solutions contribute greatly to the amazing effectiveness of today's plant starters, high analysis and liquid fertilizers. Victor chemicals serve agriculture in many ways with phosphatic solutions for fertilizers, and phosphates for feed supplements.

Today, more than 40 industries employ phosphates, formates and oxalates. For information on how these useful chemicals are put to work in your industry . . . write: Victor Chemical Works, 155 North Wacker Drive, Chicago 6, Illinois. In the West: A. R. Maas Division, South Gate, California. You'll find . . . *It pays* to see Victor!

TAKE-HOLD® PLANT STARTER
10-52-17
Completely soluble plant food
for transplanting all set-outs.
Take-Hold is produced exclusively by

VICTOR
Dependable Name in
Chemicals
for 57 Years

Suppliers' BULLETINS

Pesticide for Spring Use

Union Carbide and Carbon Corp., New York, has announced that its new pesticide "Crag Herbicide 1" will create

an early spring market for dealers because the product kills seeds and sprouts rather than the mature weeds. First application, according to the manufacturer should be made between April 15 and May 15.

A one pound package is reported to be adequate for 6,000 square feet of lawn for crabgrass or 12,000 square feet of garden when used against other types of weeds. The package retails for $4.49.

•

Bulletin on FluoSolids

Dorr-Oliver, Inc., Stamford, Conn., published last month a four-page, two-color bulletin on "FluoSolids Systems for Drying, Sizing, or Heat Treatment." The booklet contains a wash-drawing of a Dorrco FluoSolids System unit and discusses the operations and advantages of the unit in relation to the treatments under consideration.

•

New Model Tractor-Shovel

The latest model of the "Payloader" tractor-shovel was introduced early last month by the Frank G. Hough Co., Libertyville, Ill. The company has been developing and testing the new model for the past three years and claims these improvements over previous designs: twice as much carrying capacity, lifting capacity, digging capacity; over 50 degrees more productive capacity; 40 degrees of bucket tipback with breakout action; 18 cubic feet load capacity; and higher standards of safety and driver protection.

•

Velsicol Folder for Dealers

Designed to tie in with the current Velsicol Corp., Chicago, "Kill Corn Rootworms" campaign in corn producing areas, a new "Corn Rootworm Quiz folder" is offered for dealers and customers.

Touching on all phases of corn rootworm control from "What Are Corn Rootworms?" to "What are the Essential Requirements of a Corn Rootworm Insecticide?", the 19 questions and answers in this quiz do an excellent job of showing how heptachlor insecticides are used in the control of this pest.

•

New Nutro Lawn Fertilizers

A new plant food, "Nutro Plant Food Pellets," was introduced during February throughout southeastern United States by the Smith-Douglass Co., Norfolk, Va. The product is pelletized and homogenized.

•

Malathion Fly Bait

Development of a dry granular bait that attracts and kills flies effectively is claimed by the Miller Chemical & Fertilizer Corp., Baltimore. The active ingredient of the product is malathion impregnated into a granular carrier in combination with fly attracting substances.

A spokesman for Miller claims that the laboratory tests supervised by University Extension service have shown the chemical to be equally effective and more economical than sprays. Partial tests with fly maggots indicate that the bait will kill effectively for a minimum of five days after application. Under favorable conditions, applications may be effective for periods up to two weeks.

The product is being marketed under the name, "Hy-Tox Fly Bait," in a one-pound shaker can and five pound bag. The one pound can retails for a dollar.

•

Baughman Spreaders in Austria

Lime spreaders manufactured by the Baughman Manufacturing Co., Jerseyville, Ill., were represented in this year's Fair of Wels, Wels County, Austria. At the conclusion of the fair the spreaders were donated by Baughman to the Austrian government for use by the Upper Austrian Agricultural Unions.

•

Laminate Sheet Announced

Arkell & Smiths, Canajoharie, N. Y., has introduced a new laminated multiwall bag sheet, Lamo-Pak, for which it claims superior moisture retention properties.

Arkell claims that the product is more effective than asphalt laminated kraft, and that it is odor-free, less stiff and more economical. The sheet's greater flexibility prevents sewing needles from gumming.

•

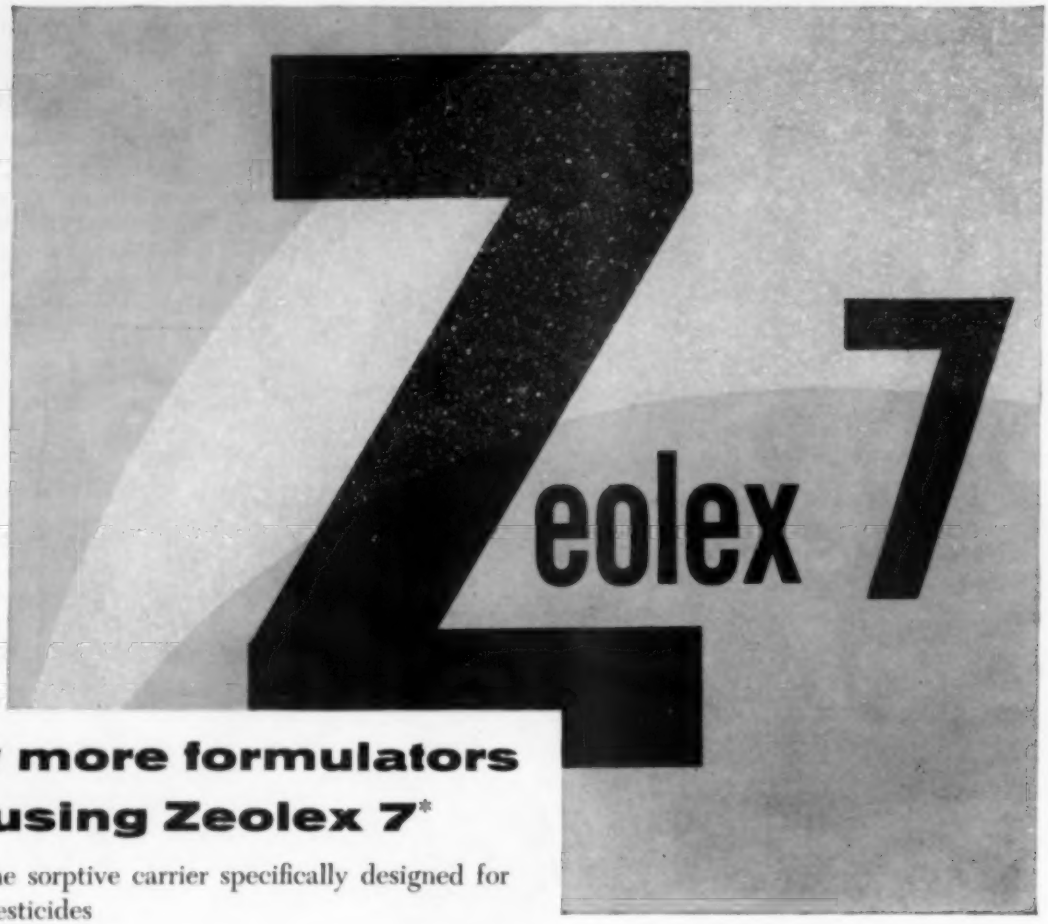
DuPont Spray

DuPont Company's "Spreader-Sticker" supplement for spray applications is now available to gardners. The material was previously restricted to commercial use by orchardists, custom sprayers, nurserymen, and other professionals. The "Spreader-Sticker" is a sticking agent which slows down weathering and spreads a spraying mixture into an even film.

•

Herbicide Mixing Bulletin

"Formulators' Manual of Herbicide Formulations," Technical Bulletin No. 43 of the Emulsol Chemical Corp., Chicago, was made available last month. It covers the latest emulsifier recommendations for high and low volatile 2,4-D and 2,3,4-D esters and the carbamate herbicides.



Why more formulators are using Zeolex 7*

—the sorptive carrier specifically designed for pesticides

DDT—With 75% wettable DDT (for WHO and FAO requirements) prolonged tests show:

- no phytotoxicity
- non-caking
- stability (confirmed by bio-assay)
- excellent suspension

Toxaphene—Zeolex 7 is recommended for a 60% toxaphene concentrate and as a carrier or bulking agent in regular concentrations.

Other Pesticides—Initial evaluation shows that Zeolex 7 is safe to use in almost all pesticides—that it does *a better job at lower cost* than other similar materials. In combination with other low-cost less sorptive carriers, Zeolex 7 provides a wide range of sorptive capacity to meet the requirements of the pesticide industry. Write for your working sample today.

*an ultra-fine sodium silico aluminate

PHYSICAL PROPERTIES:

Oil Absorption	155-160 cc/100 grams
Particle Size	0.01-0.05 microns
pH (10% slurry)	7 (approx.)
Screen Residue	0.1% maximum on 325 mesh screen
Moisture (105° C)	less than 2%
Form	Fine white powder
Bulk Density	Aerated—3 lbs/cu. ft. As packed—20 lbs/cu. ft. 50-lb. moisture barrier bags

HUBER

J. M. HUBER CORPORATION • *100 Park Avenue, New York 17, N. Y.*

Manufacturers of Clays and Pigments for the Insecticide Industry

BARDEN • BARDEN AG • SUPREX • SUPREX LG • ZEOLEX 7

New Soil Fumigant

Larvacide Products, Inc. recently announced a new soil fumigant, "Nemex-85." The product is a formulation of ethylene dibromide containing 83% by weight toxicant. The control of nematodes and certain other soil-borne pests in infested soils with "Nemex-85" is reported by the manufacturer to improve root development so that the plants show increased resistance to drought and significant reductions in the occurrence of certain wilt diseases.

•

USDA Offers AMS Series

The U. S. Dept. of Agriculture has announced publication of a series of agriculutral market service reports. A mailing list is being set up for persons or firms wishing to receive issues relating to stored-product insects. Two issues have already been published (AMS-4 and AMS-5) on the subject of fumigation of dry beans and cowpeas on the packaging line.

•

Marietta Silos in Use

Eight Marietta industrial silos, for use in storing and processing of phosphate rock, were put into operation recently at Lake Charles, La. The installation was planned by the Lake Charles Harbor and Terminal District.

Construction was handled by Marietta's branch plant at Nashville, Tenn.

•

Willson Safety Catalog

A new general catalog on industrial safety equipment is available from Willson Products, Inc., Reading, Pa. This new illustrated catalog is designed as a workable, everyday safety manual.

The catalog discusses eye protection, head protection, respiratory protection, and welding. Illustrations, descriptions, and ordering information have been correlated for simplicity and practicability.

•

Hart Announces Sequestrant

A new sequestering agent, "Kalex G," which is said to be specific for such heavy metal ions as ferric iron, nickel, cobalt, copper, zinc and manganese, has been developed by Hart Products Corp., New York. This sequestrant is claimed to have good sequestering power for heavy metal ions of chelating agents, but is not recommended for alkaline ions.

•

New Pacific C. Borax Herbicide

The Pacific Coast Borax Co., recently introduced "Ureabor," a new weed and grass killer. No mixing or spraying equipment is required for "Ureabor," it is applied dry just as it comes from 50 lb. multi-wall paper sacks.

New Calspral Aerosol Product

"Ortho 1038 Screw Worm Control" is now available in an aerosol dispenser according to California Spray-Chemical Corp., Richmond, Calif.

It is based on the same formula as previous preparations, is easy to apply and formulated with lindane and other organic insecticides. "Ortho 1038 Screw Worm Bomb" is reported to be effective against fleece maggots and Spinose ear ticks.

Letter to the Editor

AGRICULTURAL CHEMICALS

Dear Editor

As a small agricultural chemical distributor we read with much interest your recent analysis of Chemical Business of 1954 by leaders of the industry. As manager of our small business, I would like to present our version of 1954, which might be entitled "1954 — 1955 — 1956 — Where??"

This year of 1954 was another year we wondered if the chemical business really wanted representatives to service the consumer and assist in problems of insect and weed identification; application; timing, and mechanics; as well as evolving universal dosages to meet local conditions.

Much has been done to assist the local merchant on logistics and finances, in some instances through consigned stocks. In fact, in many cases, possibly good people, who might be inclined to enter into the sales and service of agricultural chemicals have been discouraged by the establishment of too many small local distributors, who in many cases would not represent the sales potential of a good dealer.

In our small area we have a feeling that the farmer doesn't always get full return for the dollar he spends on agricultural chemicals for insect and weed control. Somewhere near forty percent or more of this dollar fails to give satisfactory results. A good share of this is neither known by the grower nor the applicator; a result of insufficient training in observing results. In many cases this is a result of "high pressure sales."

1954 saw our company take the attitude that 2,4-D, DDT and other 'football' chemicals were best left unsold. From 25 thousand gallons of 2,4-D a few years ago to 10 per cent of that in sales this past year. Why? Anyone who uses 500 gallons or more, ground or plane applicator in our area can secure l.c.l. or carload distributor price. In the meantime the farmer guessed, cussed, and came up with erratic results in most areas. The general feeling being that the chemical companies having cut the price were also cutting quality.

Our organization had formerly kept three representatives; graduates in agricultural schools and trained in field work, servicing 2,4-D sales with recommendations, calibration help, timing, and observing results, plants, temperatures; while others had received instructions to stay away from sales of 2,4-D and 2,4-D customers. Who really benefitted? The major companies all lost money on 2,4-D; the dealers did not want to handle it; the distributors would not touch it in many cases; and the consumer was unhappy.

This same condition also prevailed on other crops and controls, such as seed production, potatoes, cattle insect control, premise control, and many other instances. Why?

A company in the manufacturing business puts out a technical sales representative to merchandise 150 thousand dollars and up in sales to justify his income, depending upon the company. How can he hope to see five per cent of the consumers, much less help them on their many technical aspects?

We believe the industry could and should consider the following program for 1955 and the future:

1. Develop proven products with proven background and ready for market.
2. Observe channels of sales in order to maintain service centers, and insist on proper field service to dealers and consumers.
3. Price products on economic worth and quality to include service, follow up, and a reasonable amount of backing up results. Not a Guarantee Program, but neither a Disclaimer Program.
4. Develop trade ethics as a group. Develop demand built upon individual quality, service, results; and good people and workers participating in the program upon a satisfied good consumer relation basis.

Clean House! Clean Ethics! so that chemical representatives or salesmen in the field need no longer receive the derisive, "one of those" looks or jibes when introduced; because of the cut price, unethical trade practices which now symbolize the pesticide business.

Yours very truly,

Oregon Agricultural Chemicals
W. E. Green—*Owner, Mgr.*

SOIL IMPROVEMENT CONF.

(*From Page 77*)

drilled in bands with oat seeds, oat yield per acre was 40 per cent greater.

"Effect of Fertilization, Time of Seeding and Companion Crops on Alfalfa Yields" was the topic of a paper by Dr. Richard M. Swenson, associate professor of soils, Michigan State College, East Lansing, Mich.

Tests which he described demonstrated that adding nitrogen to the fertilizer helped double alfalfa yields when the legume was seeded with wheat in the fall. Twenty pounds per acre were as effective as 40 lbs. The tests, he declared, indicate that a high soil nutrient supply is advisable for both the alfalfa and companion crop of oats or wheat. Alfalfa yields were highest when seeded alone in August or June or with oats in April. Next highest yields came from seeding alone in April and seeding after oats in August.

Educational work to encourage use of fertilizer by Missouri farmers was described by Dr. John Fallon, Univ. of Missouri, Columbia. This project was sponsored by the Middle West Soil Improvement Committee, which supplied the fertilizers used in the demonstrations. He commended the organization for its cooperation, saying it would have been impossible to carry on some of the most effective work without this help. Much of the demonstrating was done in "pioneering" fields where local interest in fertilizer seemed in need of stimulation.

In one 1954 demonstration, Dr. Fallon related, forage production on poor upland pasture was increased 2½ times; from 2,516 lbs. per acre on untreated soil to 5,960 lbs. on land where lime and fertilizer were added. At the same time, protein yield per acre was increased from 196.5 lbs. on the untreated field to 540 lbs. on the fertilized pasture.

Missouri farmers are now using about 12 times more fertilizer than in 1942, Dr. Fallon stated, and nutrient content of mixed fertilizer has increased from 21.1 per cent in 1942 to the present 31.4 per cent. Among the many factors contributing to this increased consumption, he noted the growing practice by farmers of ordering fertilizer supplies in the fall. Further sales increase, he felt, might be determined by the ability of manufacturers to supply the demand in the spring rush period.

Thursday's session on "Efficiency Factors in Production," was opened by Dr. R. L. Cook, head of the Michigan State College agronomy department, who told how "once over" tillage to prepare a seed bed in one operation is saving Michigan farmers at least $3 per acre in preparing the land for corn.

In contrast to old methods, the "once over" operation, he explained, uses a light tillage unit such as a plow packer, a rotary hoe, easy tiller or some other smoothing implement, which is hitched behind the mold board plow. Using a plow packer, he said, all the tillage necessary for producing maximum yields was accomplished. Weed control was also considerably eased. After nine years of research and testing, he stated, the new practice is widely utilized by Michigan farmers.

A survey of "Efficient Corn Production in Western and Eastern Corn Belts" was presented on Feb. 17th. Speaking for the western area, Dr. E. R. Duncan, Iowa State College, Ames, stressed that "Fertilizer alone can't do the job," there being need also for certain crop and soil management practices. Research and experience, he said, have shown that suitable fertilizer can increase yields from 20 bushels per acre to 70 or 80, "when weather conditions are favorable and subsoil moisture is satisfactory." Weather hazards can often cut yields in the western corn belt, in spite of fertilizer, he added.

Prof. H. J. Mederski, Ohio State University, Wooster, called attention to fertilizer's "carry over" power to help boost yields of all crops in the rotation when plant food is added to any one of them. He submitted figures from tests to substantiate this claim and also reported that corn yields averaged 108 bu. per acre when planting rate was 6 seeds per 42 inches of soil on fertile soil, compared with 33 bu. on low fertility soil.

The discussion of efficient wheat production was broken down to cover soft winter wheat, hard winter wheat and spring wheat separately.

Increased rates of fertilizer application, improved management practices and the development of higher yielding wheat varieties, have teamed up to increase yield per acre of soft winter wheat, Dr. S. A. Barber, Purdue Univ., said in his discussion of grower practices in this area.

Soil fertility and fertilizer use are highly important in efficient wheat production, Dr. Barber declared. For most efficient production he recommended use of fertilizer "as required to each to point of diminishing returns." He cited examples indicating that soil fertility building for future crops can be a profitable practice.

From the hard winter wheat area, Dr. R. A. Olson, Univ. of Nebraska, reported on tests showing that fertilized wheat does better than unfertilized wheat during drought periods in the Great Plains area. When nitrogen and phosphate fertilizer were used, winter wheat yields increased as much as 13 bu. per acre in eastern Nebraska. Every dollar invested in plant food, he said, returned $3 and net profit was $16 per acre.

In the spring wheat belt, wheat yields vary almost directly with the amount of moisture available during the growing season, Dr. E. B. Norum, North Dakota Agricultural College, Fargo, stated. Farmers follow the practice of leaving the wheat field fallow in alternate years, he explained, the chief benefit of this being some conservation of moisture. But fallow land, he continued, stockpiles some nitrogen in the soil. "So, actually the use of nitrogen fertilizer can substitute in part for fallow," he said, "at least to the extent of providing increased nitrogen for the following year's crop."

Dr. Norum estimated that use of nitrogen in wheat production in the spring wheat area could reduce the use of fallow from every other year to one year in three; or from one

in three to one in four years. When nitrogen and phosphates are combined in fertilizers for wheat, he reported, yields have been effectively increased on non-fallow lands.

At next year's conference, Z. H. Beers, executive secretary of the Middle West Soil Improvement Committee, announced, that it is planned to devote more time to showing such visual aids as are available for use by dealers and others to promote fertilizer sales.

The 1956 meeting dates were set for Feb. 16 and 17 and the new chairman of the College Agronomists group will be Dr. Kermit Berger of the soil department at the Univ. of Wisconsin.★★

SALES SYMPOSIUM

(*From Page 35*)

were received on cutworms on alfalfa, clover and tobacco, and Colorado potato beetle, flea beetles and leafhoppers on potatoes.

Also, heptachlor - fertilizer mixtures represent a sizable potential sales volume. While this is a fairly new technique, the idea is appealing to the majority of farmers. Here is an opportunity for the farmer to perform two tasks at the same time, thus saving valuable man-hours and money. These features are important selling points. Velsicol advertising is stressing this application to aid dealers in closing more sales.

We also look for good sales on chlordane in those areas where it is still considered to be among the most effective agricultural insecticides. Endrin, the newest of the Velsicol insecticides, is being produced in greater quantity and should be more readily available to dealers later in the year.

To help formulators, distributors and dealers sell more heptachlor insecticides this year, Velsicol has greatly expanded its advertising and sales promotion activities. For example, formulators and dealers in the corn belt area have just been provided with a colorful, comprehensive sales kit to assist them in the current "Heptachlor Kills Corn Rootworms" sales campaign. This kit provides all the tools necessary to produce sales at the consumer level. Similar kits are planned for other areas in which insects are a major problems. Along with these helpful sales promotion materials there will be more radio, magazine, and newspaper advertising.

Add it all up and it points to an excellent year for Velsicol insecticides. However, the degree to which sales can be achieved still depends a great deal on the individual efforts of the formulator and dealer. Aggressive sales effort and timely advertising are the answer.

GRAIN FUMIGATION

(*From Page 35*)

extremely promising. This same type of recirculating system is adaptable to railroad boxcars, truck trailers and ship holds, which gives a previously unused versatility.

Recirculation systems offer several distinct advantages. The cost of fumigation will be substantially lowered, since less methyl bromide will be required. The insect kill will be greatly increased because of a uni-

"Grab 'em—stack 'em—drop 'em! Burlap bags can take it."

—says R. T. Chilton, Madison, N. C.

"We buy fertilizer by the carload in 200-pound burlap bags because they're better to work with, and keep the fertilizer from molding. I prefer burlap bags because they don't break and spill. This helps us work faster and saves us money and time."

The Chilton farm covers over 1000 acres in a part of North Carolina where large quantities of fertilizer are used for growing tobacco, corn, oats, barley, lespedeza and other grains. The farmers order fertilizer in burlap bags because it keeps better and the bags are easier to handle. "We've never thrown an empty bag away. We can get 10¢ apiece for them but they are worth more to us right here on the farm. Our wives make lots of things for the house out of them, too."

Farmers all over the country tell us they prefer burlap bags for fertilizer and supplies. Make *your* brand a favorite by packing in burlap.

Just ask your own customers—

they'll tell you that burlap

Is strong — takes dragging, dropping, *man-handling* — any tough job on the farm.

Gives good ventilation — keeps farm supplies and products fresh.

Laughs at sudden showers — wetness or dampness can't weaken it.

Saves money — extra value from re-sale and re-use.

Saves storage space — stacks to any height without slipping.

Has 1000 uses — always in demand on the farm (popular with farm wives, too!)

THE BURLAP COUNCIL
of the Indian Jute Mills Association
155 East 44th Street, New York 17, N. Y.

formity of fumigant distribution. The same system can be used for aeration as well as fumigation.

The general operation will be much safer, since the system is closed and workers will not be subjected to poisonous fumes. Fumigation time will be shortened considerably, since long exposure and aeration will not be necessary.

In order to cooperate as fully as possible with the government grain sanitation program and materially aid those who find fumigation necessary, Michigan Chemical Corporation is offering the services of its engineering force, technical department and sales personnel to any individual or groups who desire help in installing recirculation systems for the purpose of fumigating bulk grains in storage.★★

FORMULATOR MARKET

(*Continued from Page* 31)

tributing channels to stock substantial quantities of pesticides in advance of the season if they are again to be faced by a situation in mid-season in which they will find two dozen dealers in the next block in position to buy a few hundred pounds of material on a "most favored buyer" price basis. This is a situation which certainly must be cleaned up if stability is to be restored to the agricultural chemical market.★★

NIAGARA SALES PLAN

(*From Page* 35)

media is the written word; manuals, spray and dust guides, advertising, and product literature. This type of grower information must be factual, informative and presented in easy to read terminology. Recommendations for farm chemicals must not only be legal, but adaptable to the problems at hand. Niagara research workers and technical service to sales personnel are continually at work to improve service to the grower thru the above methods.

Niagara is quite aware of its responsibility in making its customers aware of the new regulations in the Miller Bill. Revised labels and advice to growers pertaining to residues and application timing will be re-emphasized with these new controls in mind.

Availability and distribution of pesticides is the problem of industry. Quite often the successful solving of this facet of our business can mean profit or loss not only to the company, but to the customer as well. The warehousing of essential materials in strategically located points to meet grower needs, demands careful surveilance and grower-dealer cooperation with the manufacturer.

New products which serve a real need, or those which are definite improvements over formerly used materials, are the life blood of any industry. Niagara research chemists, pathologists, entomologists, and other scientific workers, are continually at work with this view as their goal. The wide area of use for Niagara chemicals presents many problems of formulation for any given chemical. Climatic conditions, varietal crop differences, and many factors are considered in making better Niagara formulations for agriculture.

At the dealer-distributor level, the above mentioned factors are put into the sales picture to further extend service to the grower. Instruction manuals, spray guides, literature, branch plants, warehouse stocks of chemicals, advertising, and new products, are all designed for better service and distribution of Niagara products to the ultimate user, the grower.★★

N. Y. GARDEN SHOW

(*From Page* 92)

to the problem of insuring an accurate mixture of chemical and water, although some manufacturers claimed this was no problem at all. International Research Corp., Danbury, Conn., with its "Hose-Mix't" sprayer suggests special insecticide pellets which dissolve as the water strikes them. The manufacturer assures an accurate mixture provided that only the special pellets are used and in the requisite amount.

No prize was offered for the most attractive or interesting booths, but two that drew considerable attention were California Spray Co.'s revolving Merry-Go-Round Display and Parrott Chemical Company's "View of Sphere." The latter was a large-scale application of the trick mirror. When the spectator looks into a giant glass sphere (about 6 ft. in diameter), a succession of objects appeared to emanate from the same spot. The objects, of course, were Parrott products.

Among other distributors of garden products were Monsanto Chemical Co., American Cyanamid Co., Armour Fertilizer Co., Carbide and Carbon, and Niagara Chemical Co.

CANADIAN PEST CONTROL

(*From Page 65*)

of the low temperature-solubility relationship. Ester formulations of 2,4-D and 2,4,5-T have been developed which can withstand very low temperatures and also allow the formulations to carry higher amounts of the acids than had previously been believed possible.

—A. W. Lougheed, "Producing Basic Agricultural Chemicals," *Canadian Chem. Processing*, Nov. 1954.

Insecticide Development Discussed

REVIEWING the stages of commercial development of an insecticide, J. H. Follwell declares that a long and costly process is involved. Step number one is the synthesis of the compound, followed by preliminary testing for biological effectiveness. Accumulation of chemical and physical data is then necessary after which laboratory screening determines where the compound will find its place in the field of insecticidal control.

Field plot testing, together with formulation studies takes place, and then if favorable results indicate promise, full field tests are undertaken. During the preliminary screenings and field testing work, investigations are being conducted on toxicity to warm-blooded animals, including acute, sub-acute (both oral and percutaneous) and the chronic oral toxicity.

The new chemical, having proved satisfactory to this point, is ready for commercial formulation. A pilot plant will be built for larger scale manufacture and full scale production plans drawn up. Under the Canadian Pest Control Products Act, products must be registered in Canada.

It is estimated that the cost of developing a new insecticide to the point of commercial use may run as high as one and one-half million dollars.

—J. H. Folwell, "Developing a New Agricultural Chemical," *Canadian Chem. Processing*, Oct. 1954.

FUNGICIDE TESTS

(*From Page 59*)

1% level, whereas no significant differences existed between treatments.

Eradicative Sprays

BECAUSE the occurrence of the brown-rot disease is erratic, many orchardists do not apply protective measures. Rainfall just before or during the harvest season in these orchards frequently results in heavy losses, and even in orchards receiving protective sprays, serious amounts of decay sometimes occur. In the ab-

Chemical	Amount per 100 gals.	Percent diseased fruits
Lime-sulfur	3 gals.	2.5
Lime-sulfur	2 gals.	3.0
Lime-sulfur and Flotex Wettable Sulfur	2 gals. 10 lbs.	2.4
Polysulfide Compound	2.4 lbs.	4.7
Check		29.3
L. S. D. 5%		8.1
L. S. D. 1%		11.1

TABLE 5.

Polysulfides as eradicant sprays for the control of brown rot in Sims peaches. Butte County, California, 1954.

sence of rain, brown-rot epidemics in California are infrequent. In view of these facts, it would be highly desirable to have a spray material which would act as an eradicant of incipient fruit infections.

Loss of fruit is negligible if fruits are picked and canned within 72 hours after the beginning of rain. It is on the fruits that cannot be picked and canned within a short time after a rain that an eradicative treatment would be valuable. It would appear that the most effective timing for eradicative sprays would be immediately after precipitation.

Preliminary laboratory tests were designed to determine the eradicatory properties of the following materials: Purex, XSF No. 3, Orthocide 50W, Manzate, Mathieson Bulb Fungicide No. 275, Flotox Wettable Sulfur, Phygon XL, Isothan Q15, Dowicide A (M-244), and lime-sulfur. In addition, Tag and Puratized Apple Spray, materials known to possess eradicatory properties, were tested, though they could not be used commercially because of their mercury content. Promising results were obtained with Tag, Puratized Apple Spray, and lime-sulfur. These materials were then used in orchard tests, the results of which are shown in Table 4 on page 58.

Lime-sulfur, and polysulfide compound were then tested on Sims peaches for eradicative action. The trees were sprayed first with a spore suspension, and later, the same evening, moisture was applied with an air-blast sprayer, to keep the trees continually wet for an infection period of 13 hours. Immediately after the infection period, various spray concentrations of polysulfides were applied at the rate of 5 to 6 gallons per tree. The results, given in Table 5, indicate that these polysulfide materials are effective in the eradication of incipient infections when applied 13 hours from the beginning of moisture application. No significant differences were found between the various treatments. The mixture of liquid-lime sulfur and wettable sulfur appeared to give results as satisfactory as lime-sulfur alone.

Further experiments were designed to determine how soon eradicants should be applied after a rain. An application of lime-sulfur, 2 gallons per 100 gallons of water, 38 hours after the beginning of precipitation appeared to give as good control as applications made 14, 17, and 20 hours after the beginning of precipitation. These tests were made on a small scale, and further trials are necessary before specific recommendations can be made.

Conclusions:

SPRAY preparations containing captan, one of the carbamate compounds, or wettable sulfur, appear to afford good protection to peach fruit against infection by the brown-rot fungus. Of the materials tested for eradicative action, lime-sulfur proved effective in arresting the development of infections that occur during rains. This material, at 2 gallons per 100 gallons of water, applied 38 hours after the beginning of a rain which initiated the infection, prevented further development of the fungus in the fruit. In the event of rain during harvest, therefore, a combination of lime-sulfur and wettable sulfur offers a means of arresting incipient infection and protecting fruit against further infection under California conditions.

During the 1954 harvest season for canning peaches, considerable amounts of lime-sulfur and lime-sulfur plus wettable sulfur were applied by growers after a rain in late August. This practice probably prevented severe loss from brown rot. In some orchards fruit drop was heavy during this period. No conclusive evidence was found that lime-sulfur or other spray materials used in the orchards caused this drop. Excessive phytotoxicity was not observed in any of the sprayed orchards.★★

WASHINGTON REPORT

(*From Page 61*)

This would seem to scotch some stories that farmers don't have money to spend or that farmers aren't going to buy pesticides. This investment in Virginia seems to show that farmers will spend money, and a lot of it, when they believe there's a chance to make money. Maybe this shows that more fertilizer and pesticides could be sold if presented to the farmer in terms of profit potential.

* * * * *

There's a lot of money in the farmer's sock despite falling parity ratios. During the past year, agriculture's total equity increased by two billion dollars, reaching $145 billion. Farmers' holdings of cash deposits, currency, U. S. Savings Bonds, and investments in cooperatives increased slightly.

Farm debt stayed about the same last year, slightly over $17 billion. Take a $17 billion debt, match it against a $162 billion figure of total assets, and we come to the conclusion that it's not a waste of time to try to sell something to farmers.

* * * * *

If the irrigation trend continues, it could well enlarge the market for pesticides. Here is the kind of arithmetic on which sales pitches can be based when talking to irrigation farmers. A study of 29 irrigated tobacco farms in North Carolina shows that the average gross increase in income from irrigation was $210 per acre during a recent year. The average net increase in profit, $161 per acre.

Tyler H. Quakenbush, irrigation engineer, Soil Conservation Service, Washington, at a recent meeting observed that such reports as those on tobacco, " . . . indicate that a sprinkler irrigation system which should give 15 to 20 years of service could be paid for from increases in profits in one year."

Commenting on the need for irrigation on a regular basis rather than just during the spectacular drought years, he called attention to studies which "show quite convincingly that soil moisture deficiencies occur often enough in the humid regions of the U. S. to make irrigation necessary every year in order to obtain maximum crop yields."

This opens the frontier for pesticide companies, herbicide companies, and fertilizer companies as well as

seedsmen and farm equipment manufacturers. In this "Garden of Eden" kind of farming, you know there is going to be enough water; so everything must be timed just right, up to the very limit of scientific knowledge as evidenced in equipment and chemicals which the farmer can buy and use. Under ordinary farming, if a farmer controls one-half or three-fourths of the bugs it may actually be his best profit-making level. With irrigation, his profit level would more likely continue to rise as his pest control program improves.

Company lawyers may find interesting reading in the host of legislative proposals before state legislatures. Water laws are reasonably well-stabilized in the 17 western states. The remaining 31 eastern states, however, face the serious problem of developing laws permitting an expanded use of water resources by agriculture, industry, and others. The Supreme Court water policy committee has recommended a state water law based on the plan of the western states, whereby priority rights to streams and lakes can be established and existing rights protected. Priority use is in this order: domestic, municipal, irrigation, industry, recreational, water power. There are tremendous variations in the legislative proposals.

Certainly the speed with which developments will be continued gives farmers assurance of certain rights to water supplies in times of drought when priority usage restrictions might be invoked. Since an irrigation system is often the most expensive investment a farmer makes next to buying a farm, he needs to have a reliable source of water.

Most agricultural specialists we've talked to are optimistic about the increase in acres under irrigation in the 31 humid eastern states. The speed with which irrigation develops is a question on which few care to make even a guess. If we're really in a dry decade, as many meteorologists say, then the five or six remaining dry years will give enough impetus to push legislation through state legislatures, giving the farmers the assurance they wish in most instances.

Pesticides, herbicides, and fertilizers for irrigation farmers could be made most attractive.

* * *

Executives of fertilizer and pesticide companies may be especially interested in the new booklet issued by the Dept. of Agriculture — "More and Better Foods." This 43-page leaflet is composed entirely of charts and pictograms and could be effective in employee relations. The booklet describes the revolution in food production, processing, marketing, and consumption. Fertilizer, pesticides, and herbicide manufacturers, along with the seed trade and implement manufacturers, take a bow in the pages of this text.

Free copies are available, within limits, from the Dept. of Agriculture. Write to: Office of Information, U.S. Dept. of Agriculture, Washington 25, D.C. It may be possible to borrow the plates, permitting integration of company information.

FOREIGN TRADE

(From Page 49)

tomer inexperienced in foreign trade, for he is similarly impressed.

But in our industry the fact that we are not internationalists takes on a special importance, with potentially serious consequences. We know that we must "regionalize" our selling and labelling or we will run afoul of regulatory agencies, dissatisfied customers, and uncollectable accounts. And because our industry's products do have such an amazing reproductive power, we have come to expect the product to earn its cost, making terms of sale somewhat secondary, whether we be paid when shipped or at harvest time. We also characteristically invest a certain amount in technical service, developmental work, and public relations, to see that the products maintain a competitive degree of effectiveness. With that we insure profit for all, repeat business, low-cost selling in the long run.

Of course we do the same things in foreign markets, but just as the optimum level had to be determined in the past many years of "selling" in the domestic market, so do we have to progress in that direction in foreign markets. Certainly the aggregate effort that built the present degree of predictability in our domestic business is not being reflected in foreign markets. Yet we sell the insurance to cover truly unique contributions that this country is making to the economic progress of the free world. In dollars and cents, the average budget for sales and for selling expense shows that our $50 million export volume is often being sold on the basis of "caveat emptor"—let the buyer beware—despite our reliance upon a great deal closer relationship with customers in all our other markets.

The answer to that problem, if there be one, seems to be in the use of effective "propaganda" in the broad sense of the word. When we use "propaganda" to describe biased exaggeration, we spoil a very expressive word—our European friends use it to mean the fullest possible exchange of ideas, views, information and advertising. That is what we depend upon in domestic business, and what is remarkably lacking in our booming foreign business — even to the extent that government agencies, while often handicapping private trade by prohibiting the use of brand names, insist on some labelling that is purely for propaganda purposes.

At home, we have to know our customer . . . his problems . . . his inventories . . . his customers . . . etc., yet when political or particularly ocean barriers intervene, we traditionally rely upon "purchase and sale" trading methods. We accumulate some statistics, some correspondents, some people that we visit—but we have never had the flow of propaganda to and from the areas concerned, such as we rely upon in managing our domestic affairs. There is some "reporting" by agricultural attaches, some news stories about "Missions," some bulletins — but only a small fraction of the organizations whose plants are directly or indirectly affected by world trade in pesticides are as well informed as similar

organizations in countries with whom we compete in our markets abroad.

Chemicals A Factor

THE second point we lack in surely evaluating the future of our industry is that chemicals as we know them are but tools to the customer, like the steel in his plow. We often sell chemicals, but the farmer always buys pesticides. We understand quality as it affects the yield of chemical product or formulation. We have seen our U. S. farmer customers learn to handle fifteen complex chemical names, when they used to know only "poison." Yet even in this advanced country with half a century of intensive use of pesticides there isn't much quantitative economic relationship, in the everyday understanding of the user, between pesticides and agriculture. While the problem of expression of the economics is greater than in the case of plant foods, there is so little knowledge from the standpoint of agricultural tools, by comparison with that accumulated to support the use of fertilizers, that we must grant a degree of neglect of an important field.

The importance of that — to world trade — is simple. Today our trade is partly traditional exchange of well-known materials, which have never been used to fullest advantage, and partly the movement of the newer materials, greatly stimulated by the "aid" programs that have relied upon them for control programs of very high military, political, or economic priority. Yet with all the volume there is, the value to agriculture alone can increase the annual production of goods more sharply and more dependably than any other means—in the predominantly agricultural countries concerned—if the countries of the free world forge ahead in that respect. The closest possible orientation of our chemicals with their end-use—public health or agriculture—is of tremendous importance. If performance specifications are dependable, realistic, and above all well-known to all and well-represented, the same effectiveness of product, salesman, and customer that has survived to characterize the domestic

operation of the industry can be depended upon in foreign trade as well.

U. S. in World Trade

THE third factor important in the industry's world trade is a modest one—to keep in step with the rest! Possibly that is an understatement, but it stems from the conviction that we are in world trade deeper than we think, needing all the background we can muster. With our industry small and demonstrably cooperative, there is need to coordinate our work and to orient our program with the best of those industries serving related fields. Much has been learned by industries more or less intensively active in this country's world trade, and there are problems which, if not common to all, are at least shared by many. The rapid growth of our industry in volume if not in stature insofar as world trade is concerned, leads to the conclusion that a great deal of benefit can be obtained from a close understanding of and working relationship with other industries and agencies that can buttress our own efforts and themselves benefit from the association. Again we have only to look to our more successful competitor nations for a precedent for such teamwork—for outstanding gains in world trade have sparked the economic resurgence of several countries since World War II, with a solid foundation of teamwork by all interested participants.

When the National Agricultural Chemicals Association organized a Foreign Trade Committee a few years ago, it significantly took as its policy:

> " . . . to aid in extending into the field of international trade with export markets the relevant elements of the program that NACA maintains on behalf of its members and other members of the industry regarding insecticides, fungicides, herbicides, rodenticides, and similar materials essential to public health, and production and preservation of food, feed, and fiber crops in the free world, and to advise the Board of Directors of such additional elements as may from time to time warrant inclusion in the NACA program in the interest of its maximum effectiveness in the field of foreign trade."

Saying the same thing in another way, Edward A. O'Neal, Jr., vice president of the Overseas Division of Monsanto Chemical Company recently told the members of the American Pharmaceutical Manufacturers Association that it should . . . "expand abroad, using the same promotional drive for promoting foreign business that it uses in its domestic markets . . . "

With that in mind, the importance of pesticides to agriculture and to public health, irrespective of national boundaries and oceans, commands the attention of many if not all the members of our industry. It warrants our utilization of the methods and the principles the industry has used to put the United States of America in its present position of leadership, applied to all the countries that we value as allies and would like to have as prosperous participants in a free world. That which has built a strong and profitable industry at home should be an equally effective program everywhere — whereas we know that a lesser interest and effort merely prolongs a holding action that perpetuates no market—in a situation that certainly demands our best effort in equipping the free world with the advantages that we in this country attribute to freedom.★★

N. W. CONFERENCE

(*From Page 54*)

Life history and habits of pests to be controlled should be well known and control programs based on such knowledge," concluded Dr. Manis.

Bee Poisoning Problems in Washington

"THE main bee poisoning problems in Washington are associated with tree fruits, alfalfa grown for seed and in the production of cabbage seed," Dr. Carl Johansen, State College of Washington Entomologist, Pullman, stated. In tree fruit districts beekeepers have their holding yards too close to orchards and 90% of the bees poisoned are

poisoned because of the recommended pre-pink application of parathion, which is the spray that causes most of the difficulty, especially when adverse weather holds up spray applications. Insecticides should not be applied to blooming orchards. Spray drift is hard to handle and hives should be placed in orchards when 10-20% of bloom is past and removed as soon as possible.

With pollination the limiting factor in alfalfa seed production, pollinators are of extreme importance to the seed grower. As a result of experiments performed in 1953, it was found Systox could be used on alfalfa when bees were not foraging and would give both aphid and mite control. As a result, quite a bit of Systox was used in 1954 for this purpose. In an attempt to answer the question of Systox possibly ending up in the nectar, and concentrations of this pesticide in honey, a series of experiments were run in an isolated area of eastern Washington. Here blocks were laid out, each plot of alfalfa had its own hive of bees and new frames were placed in each hive *after* the Systox treatments were applied. Two series of tests were run—one was treated before 7 AM and the other in mid-afternoon, right on top of the bees at work. There was no adverse effect on the bees in any of these tests. A check of hives used in morning and evening applications showed no difference between the numbers of dead bees or in the amount of honey produced. Aphid control was excellent. Systox residues on honey were taken at 7 and 21-day intervals. On analysis, .16 ppm or less was found on honey produced by bees from treated areas.

Repellency tests in the hope to lessen bee poisoning were made using parathion, parathion and toxaphene sprays, and a dust composed of parathion, toxaphene and sulfur; all of which were applied by air. The dust plot was the only one which gave any bee repellency, but the highest rate of bee poisoning occurred on it (alkali bees were not repelled). While dusts appeared to give higher mortalities than spray applications, kills were experienced with all three groups of test materials used.

Fact and Fancy in Herbicide Work

Dr. Virgil Freed, Oregon State College, reviewed the use and application of herbicides. Following a resume of the history of weed control, Mr. Freed reported that at present, the discovery of new materials is increasingly difficult . . . that in 1954 three or four new weed killers were released, but current screening programs are both expensive and time consuming. The solution to this situation, Freed feels, is a more scientific and systematic approach to the problem by applying some of the techniques learned in chemistry, physics, and mathematics.

"'If you find something wrong with a plant you can't explain, it's a virus'—this is the common thinking of farmers I have worked with, and they may not be too far wrong in many cases," stated Clark Amen, Oregon State College entomologist.

Although 7 orders of insects carry virus diseases, two families of the Homoptera, aphis and leafhoppers, bring farmers the most grief. Being sap feeders, they feed in the zone of the plant where the causative organism of the virus is located. As viruses require a living cell for reproduction, if the insect vector can be stopped, control may be achieved, but often this is not easy to do because symptoms of the disease on crop plants may be masked, or seen too late for effective control. For an effective program, we need to know not only the insect vector, but *how* it transmits the disease and the source of the infection; then we can begin to get at the problem.

"Chemicals certainly have a place in the virus control picture, but we need to know what to use, how to use it, when, and where—to do the most good," concluded Mr. Amen.

Legislation

Mr. Keith Syme, Chipman Chemical Co., Portland, reported to the group the activities of the Northwest sub-committee of the Western Agricultural Chemicals Assn. on legis-

delay the blossoming of certain fruits. lation. The committee last year assisted industry representatives to present their case for the use of 2,4-D and similar herbicides at the Washington state legislature. As a result of this work, the Washington legislature allows optional local control areas, rather than a state-wide ban on certain formulations of 2,4-D.

Business Meeting

In a brief business meeting, E. Turner, California Spray-Chemical Corp., Portland, was elected chairman for the 1956 Industry Conference Meeting. Dates for the Conference were announced as January 18, 19, 20, 1956 in Portland, Oregon.

Mr. C. O. Barnard, secretary, Western Agricultural Chemicals Assn., advised the membership of WACA plans for printing and distributing safety posters.

The 1955 conference chairman, O. B. Hitchcock, was assisted by Charles Starker, Pacific Supply Cooperative, and Bob Eichman, Stauffer Chemical Co., in arranging the program of speakers and supervising the publication of digests of researchers' reports at the Vegetable and Spray Conferences. Registration was handled by C. O. Barnard.★★

PENN. AG. STATION

(*From Page 55*)

insecticides over commonly used mercuric compounds in cabbage insect control. He also has found the mode of action of mercury as an ovicide. In like manner, C. W. Rutschky has made major discoveries in corn earworm control and in the fundamentals of how ovicides operate on insect eggs.

Until the recent withdrawal from station work of H. W. Thurston, Jr., he and F. H. Lewis double-checked the usefulness as they appeared of new fungicides for use on orchard fruits and potatoes. Major changes in the formulation of Fungicide 341, for instance, were made as a result of these studies.

A wide field of experimentation was opened a few years ago when D. G. White discovered that sprays containing maleic hydrazide would delay the blossoming of several fruits. Similarly, sprays containing naphthalene acetic acid have been used with considerable success by Lorean D. Tukey in thinning apples and peaches. Chemicals for promotion of red color on apples and for the inhibition of vegetative growth of fruit trees also are being investigated by these research workers.

Forest operations have become in recent years a much larger outlet for agricultural chemicals than formerly was the case. Research at the Pennsylvania station by Norton Cope, H. W. Popp, and Mervin Reines has revealed the basic action and usefulness of such tree poisons as "sodium arsenite." This material is a "debarking" compound which saves much labor in pulp wood cutting. Certain other chemicals have been tested by W. C. Bramble and C. L. Fergus in attempts to stop the spread of oak wilt. A major phase of wood utilization hinges on use of the newer wood preservatives.

The staff of the Agricultural Experiment Station consists of 250 or more members of the resident staff of the College of Agriculture. The majority divide their time equally between research and teaching, and a considerable number work at research full time or conduct research while teaching graduate students.

Recent annual station budgets have totalled about $2,000,000. Nearly 4,000 acres comprise the University farms.

Pennsylvania soil and climatic conditions are so varied that field or fruit research laboratories have been maintained at Landisville, North Side, Arendtsville, and Kennett Square for many years.

Reports of research of general interest now are published in "Science for the Farmer," a quarterly put out for farm leaders by the College of Agriculture.★★

FOA COLOMBIA PROGRAM

(*From Page 48*)

Lack of efficient channels for disseminating known information and lack of proper agricultural education limits the usefulness of the present knowledge accumulated.

In recent years, there have been economic limitations on the U. S. dollar. The Colombian Government prevented the purchase of some products produced in the United States, keeping as many dollars as possible in the country, in an effort to stabilize the economy.

At this point it might be asked, "Is there real need for expansion of agricultural-chemistry in countries such as Colombia?" It is felt that the answer is a definite "YES." Generally speaking, crops respond as well to commercial fertilizers as they do in the United States. Insect and disease problems on many of their crops are as great. Greater agricultural efficiency may be obtained by weed control, preservation of fence posts, etc. However, any expansion in the use of agricultural chemicals in Colombia will be limited by the above mentioned factors. Experience has shown that a marketing program that excludes both experimental and demonstration work as we know it in the United States is doomed to failure.

PATHOLOGISTS

(*From Page 40*)

Even so, this relatively new field has by no means been exploited.

New soil fumigants and better methods for applying them are providing some growers with improved means for effectively combating many of the plant-parasitic nematodes and other soil-infesting plant disease organisms.

Most recent of all is the discovery that certain antibiotics offer much promise for the control of some plant diseases hitherto difficult to check without injury to the plant. Among these diseases is an old orchard killer, fireblight of apples and pears. At the Missouri Agricultural Experiment Station last year, phytopathologists achieved 100 per cent control of apple fire blight with a spray formulation containing streptomycin and terramycin.

And so phytopathology moves ahead toward a goal that may never be achieved—the control of all plant disease. But whether or not achievement does ultimately come, the pathologist knows that each progressive step toward this goal benefits mankind. Here in the United States each new discovery, whether it is of fundamental importance to the scientists or of practical use to the grower, serves to safeguard the prosperity, good health, and strength of this nation.★★

PO, INSECTICIDES

(*From Page 43*)

chloro-ethylphosphonate) is one that is particularly interesting from a theoretical, as well as from a practical point of view. It has been proved to be an effective fly control agent, with rapid knockdown action, and it shows promise in the pest control field. Preliminary tests indicate that Dipterex effectively controls certain chewing insects on agricultural crops. Furthermore, there are indications that it may be useful for internal treatment of cattle against cattle grubs (4).

Dipterex is an active cholinesterase inhibitor in vitro. The enzyme-inhibitor complex formed by interaction of Dipterex and cholinesterase in vitro is stable, in accordance with the theories mentioned above. K. P. DuBois (2) has shown, however, that an outstanding difference exists between Dipterex and other organic phosphates, inasmuch as the duration of action of sublethal dosages of Dipterex in mammals seems to be extremely brief. Complete recovery of acutely poisoned rats was observed to occur within a few hours after poisoning. It is assumed that some mechanism is operative in the intact animal that causes rapid dissociation of the enzyme-inhibitor combination or, in other words, rapid reversal of the cholinesterase inhibition. The oral

acute LD-50 of the Dipterex active ingredient to rats was found to be in the neighborhood of 500 mg/kg. Unusually high fractions of an LD-50 were tolerated by rats in subchronic treatment studies, and more than one-fourth of an acute lethal dose daily was required to produce mortality during a 60 day period of treatment. Thus, Dipterex appears to possess certain unique properties which, in combination with its insecticidal effectiveness, make it an interesting addition to the list of currently available pesticides.

Looking back as well as toward the future, it does not appear unlikely to anticipate further interesting developments in the organic phosphate field. Much is yet to be learned about the mechanism of action of these compounds, about the factors that decrease or increase or otherwise influence their effectiveness, about possible synergists, and other elements involved in their performance. Formulation is another field which seems to be wide open to improvement. Furthermore, there are indications that new interesting organic phosphates will soon emerge from the various steps of screening and testing to which the current generation of candidates is being subjected. It thus appears that the remarkably fast and encouraging progress already made on the basis of the pioneer work of G. Schrader and others on the research team of Farbenfabriken Bayer will not come to an end within the near future, but that valuable further contributions to chemical pest control as well as to the general advancement in science may be expected from the organic phosphate field.

Summary

THE mechanism of action of organic phosphoric acid esters in mammals and in insects according to the present state of knowledge is reviewed. An outline is given of the basic principles of systemic pest control, with special reference to the interrelations between plant, insect, toxicant and environment. Recent developments and trends in further research in the organic phosphate field are discussed.

Acknowledgement: The author wishes to express her gratitude to G. Schrader, G. Unterstenhöfer and W. Wirth for many an inspiration obtained through exchange of thoughts and ideas, and to thank G. Unterstenhöfer for his kind permission to utilize ideas and conceptions first developed by him in the preparation of figures 4 and 5, as well as for making available unpublished data on the relative effectiveness of Systox and Meta-Systox (Tables 1, 2 and 3).

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CANNERS MEET

(*From Page 81*)

himself. Pest control is a dynamic business. We have exceptional weapons for effective programs—if they are used responsibly.

"At the risk of being called trite, it behooves everyone to read the label statements on pesticide formulations and to adhere to their directions for safe use. A chemical may be recommended for use on carrots, and research shows it to be equally effective on onions. If it it not label-accepted for onions, it should not be used. To take the law into your own hands is to invite trouble. I feel confident that the Food and Drug Administration plans to fulfill its responsibilities under the new amendment and seize commodities with excessive residues of chemicals on crops for which tolerances have not been adopted."

Discussing pesticide residues, Dr. Palm suggested that in all probability a procedure will be established "for the determination of residues of a particular class, i.e., chlorinated hydrocarbons, phosphate chemicals, arsenicals, etc. It is likely that the total parts per million of allowable residue, when residues are present from two or more pesticides in the same class, will be subject to definite limitations to avoid a build-up of residues beyond a safe limit.

"It seems likely that tolerances will be established on the basis of toxicity of the pesticide to warm blooded animals and the necessary levels essential to control the pest or pests. For example, if a given pesticide is not hazardous to man at residue levels of 10 ppm, but data from field experimentation show that control is attained, leaving residue levels of around 2 ppm, it appears likely that the tolerance will be established around the lower figure, since is seems consistent with the policy of the Food and Drug Administration to keep residues as low as possible consistent with toxicology and pesticidal effectiveness."★★

NFA Advises Farmers

The National Fertilizer Association has published bulletins recommending use of fertilizer to improve pasture and haylands. According to agronomists quoted in these bulletins, pasture land is the cheapest and most simple method of feeding livestock. John F. Shoulders, extension agronomist, Blacksburg, Va., reports that in Virginia, well-fertilized pastures are ready for grazing as much as two weeks earlier than unfertilized pastures. Mr. Shoulders claims that feed from these pastures is superior to commercial types.

The bulletins advise application of 300 to 400 pounds of 4-16-8 or 5-10-10 fertilizer per acre of bluegrass or native pasture. For rotational pastures from 400 to 800 lbs. of 5-10-10 or 2-12-12 fertilizer or the equivalent are recommended.

•

THE PRESIDENT'S 1954 SAFETY AWARD recently went to Smith-Douglass' Company's Norfolk plant in recognition of its 1954 safety record.

Classified ADVERTISING

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, P.O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

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Index to ADVERTISERS

American Agricultural Chemical Co. .... Feb.
American Cyanamid Co. 30
American Potash & Chemical Corp. 52
Andrews, W. R. E. Sales, Inc. 89
Antara Chemical Div., General Dyestuff Corp. 15
Arkell & Smiths 64
Armour & Co. 71
Ashcraft-Wilkinson Co. 11
Atlantic Refining Co. 14
Atlas Powder Co. 50
Attapulgus Minerals & Chemicals Corp... 4, 29

Bagpak Div., International Paper Co. 25
Baughman Mfg. Co. 126
Bell Clay Co. ..... Feb.
Bemis Bro. Bag Co. 10
Bennett Industries ..... Feb.
Berkshire Chemicals, Inc. 119
Bradley & Baker ..... 3rd Cover
Bradley Pulverizer Co. 128
Burlap Counsel of the Indian Jute Mills Ass'n. 116
Butler Manufacturing Co. ..... Jan.

California Spray Chem. Co. 70
Chemagro Corp. 94
Chemical Construction Corp. 19
Climax Molybdenum Co. 60
Cohutta Talc Co. 136
Colloidal Products Corp. 85
Columbia Southern Chemical Corp. ..... Dec.
Combustion Engineering, Inc., Raymond Division 8
Continental Can Co., Shellmar Betner Div. 106
Wm. Cooper & Nephews, Inc. ..... Jan.
Cox, Dr. Alvin J. 135
Crowley Tar Products Co. 97

Davies Nitrate Co., Inc. 131
Davison Chemical Co., Div. of W. R. Grace & Co. ..... Feb.
Deere & Co., Grand River Chem. Div..... Jan.
Diamond Alkali Co. 100
Doane Agricultural Service, Inc. 136
Dorr-Oliver Co. ..... Feb.
Duval Sulphur & Potash Co. 11

Emulsol Corp. 67
Exact Weight Scale Co. 111

Foesy & Besthoff, Inc. 132

Fairfield Chemical Div., Food Machinery & Chemical Co. 98
Flint Steel Corp. 90
Floridin Co. 96
Fry Co., Geo. H. 129
Fulton Bag & Cotton Mills ..... Feb.

Geigy Co. ..... Feb.
General American Transportation Corp... 104
General Aniline Film Corp. 68
General Chemical Division, Allied Chemical & Dye Corp. 27
Glendon Pyrophyllite Co. 123
Grace Chemical Co. 28
Grand River Chemical Division of Deere & Co. ..... Jan.
Greeff & Co., R. W. 115

Hammond Bag & Paper Co. 18
Hardinge Co. ..... Feb.
Heckathorn & Co. ..... Feb.
Hercules Powder Co. ..... 4th Cover
Huber, J. M. Corp. 110
Hudson Pulp & Paper Corp. 57

International Minerals & Chemical Corp. 12, 24

Jefferson Chemical Co. ..... Dec.
Johns-Manville Co. 91
Johnson, C. S. Co. 124

Koppers Co. ..... Feb.
Kraft Bag Co. ..... 3rd Cover

Lancaster, Allwine & Rommel 136
Lion Oil Co. 6
Ludlow-Saylor Wire Cloth Co. 92

Marietta Concrete Corp. ..... Jan.
McDonnell, Dr. C. C. 135
McLaughlin Gormley King Co. 134
McDermott Bros. Co. ..... Jan.
Metal Salts Corp. ..... Feb.
Michigan Chemical Corp. 113
Mine Safety Appliances Co. 130
Monsanto Chemical Co. 22

National Agricultural Chemicals Ass'n.... 118
Naugatuck Chemical Division, U.S. Rubber Co. 122
Nelson, Edward S., Ltd. ..... Feb.
Neville Chemical Co. ..... Feb.

Ninol Laboratories, Inc. ..... Jan.
Niagara Chemical Div., Food Machinery & Chemical Co. 13
Nitrogen Div., Allied Chem. & Dye Corp. 9

Oldbury Electro Chemical Co. 130

Pacific Coast Borax Co. 17
Penick, S. B. & Co. 87
Pennsylvania Industrial Chemical Corp... Dec.
Pennsylvania Salt Manufacturing Co..... 102
Pfizer & Co., Inc., Chas. ..... Jan.
Phelps Dodge Refining Corp. 99
Phillips Chemical Co. 26
Pittsburgh Coke & Chem. Co., Agricultural Chemical Div. 76
Pluess Staufer Co. 132
Potash Company of America 3
Powell, John & Co. ..... 2nd Cover
Prentiss Drug & Chemical Co. 69

Raymond Bag Co. 84
Raymond Division, Combustion Engineering, Inc. 8
Republic Steel Corp. ..... Feb.
Renneburg & Sons Co., Edw. 127
Riedeburg, Theodore Associates 135
Rohm & Haas Co. 66

Shell Chemical Co. 20, 21
Southeastern Clay Co. ..... Jan.
Spencer Chemical Co. ..... Feb.
Spraying Systems Co. 132
Squibb Taylor Inc. 103
Standard Agr. Chemicals Inc. 72
Stauffer Chemical Co. 93
Stoker Co., H. S. 120
Sturtevant Mill Co. 78
Summit Mining Corp. 121

Tennessee Corp. 7
Texas Gulf Sulphur Co. ..... Feb.
Thomas Alabama Kaolin Co. 117
Tobacco By-Products & Chemical Corp... 88
Townsend, Dr. G. R. 135

Union Bag & Paper Corp. ..... Feb.
Union Special Machine Co. ..... Feb.
Union Standard Equipment Co. 134
United Chemical Co. ..... Feb.
United Clay Mines 130
U. S. Industrial Chemicals Co. ..... Feb.
U. S. Phosphoric Products Div., Tennessee Corp. ..... Jan.
U. S. Potash Co. 80
U. S. Steel Corp. 82

Vanderbilt Co., R. T. 105
Velsicol Corp. 16
Victor Chemical Co. 108
Virginia-Carolina Chemical Corp. 88
Vulcan Stamping & Mfg. Co. ..... Jan.
Vulcan Steel Container Co. 101

Williams Patent Crusher & Pulverizer Co. 23
Willson Products, Inc. 133
Wisconsin Alumni Research Foundation ..... Feb.
Woodward & Dickerson, Inc. 128
Wyandotte Chemical Corp. ..... Jan.

Young Machinery Co. 125

Zonolite Co. ..... Jan.

Tale Ends

SOME very good advice was offered to growers and crop dusters by Dr. Charles Palm in his talk bffefore the National Canners Association late last month. He warned against the tendency to give a crop one last insecticide treatment too close to marketing date, and the widespread weakness for using a new pesticide on a crop for which, though it may offer effective control, it has not yet been OKayed by USDA for use. (See pg. 81). The word we get is that such experiments may be costly this season. They're going to be serious about these residue limits.

Aerosol packaging of agricultural insecticides for outdoor use, rather than in a confined space, presents some interesting problems. First, how do you get the aerosol fog to settle on the potato patch, and not drift over into the next county? Then, how do you tell just where you left off, when interrupted in the middle of a row? Du Pont have solved the second problem by introduction of a trace powder into one of their newer aerosol dispensers for a herbicide, but on the first point we have a feeling that more insecticide may end up in the air than on the treated plants.

AC

We'll be situated to try out this and other new gadgets and products ourselves this season, and get the answers first hand. In our new suburban offices "Agricultural Chemicals" has an acre or so of land, some of which will be turned over to "experimental test plots." And we'll pick a tomato or two, or an occasional ear of corn for lunch.

AC

Our Florida correspondent reports a "Mayfield" operating at the Palm Beach dog track this season. No, not old Paul Mayfield, but a 56 pound brindle greyhound, who can turn a fast 5/16 of a mile. Page Jack Miller.

AC

Paralleling the adage, "one mistake catapults into many more." Dr. Rosmarie Von Rumker called us the other day to point out that although she did not correct the *Houston Chronicle* in its story reporting that she and her family escaped from Bavaria, *Ag. Chem.* reported the same wrong information last month. It was Silesia that they left in a hurry to escape the advancing Red army.

AC

Our award for understatement of the month goes to the usually rather vigorous Federal Trade Commission who could think up nothing stronger than "false, unfair and deceptive" to characterize the advertising claim made for an imported fertilizer product "Actumus" which was claimed to be 1000 times more effective than manure. If the stuff is really that good, we can expect any day now to have the Russians calmly claim to have invented it.

AC

Meet Scott F. Runkle . . . who has just taken over the post with the National Agricultural Chemicals Association, recently vacated by Val E. Weyl, in charge of publicity and public relations matters. He has been active in public relations work in Washington since 1948, and prior to that time was with "Time" magazine in New York and later a foreign correspondent for "Time" and "Life" in Europe. A native of Ohio, he is a graduate of Culver Military Academy and Dartmouth College. He was a lieutenant-colonel on General Bradley's staff during the war.

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